

# TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

## ANALYTICAL REPORT

TestAmerica Laboratories, Inc.  
TestAmerica St. Louis  
13715 Rider Trail North  
Earth City, MO 63045  
Tel: (314)298-8566

TestAmerica Job ID: 160-15482-1  
Client Project/Site: West Lake Landfill  
Revision: 1

For:  
Tetra Tech EM Inc.  
415 Oak Street  
Kansas City, Missouri 64106

Attn: Ms. Emily Fisher



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Authorized for release by:  
3/30/2016 9:55:05 AM

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### LINKS

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*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

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# Case Narrative

Client: Tetra Tech EM Inc.  
Project/Site: West Lake Landfill

TestAmerica Job ID: 160-15482-1

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**Job ID: 160-15482-1**

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Laboratory: TestAmerica St. Louis

Narrative

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## CASE NARRATIVE

**Client: Tetra Tech EM Inc.**

**Project: West Lake Landfill**

**Report Number: 160-15482-1**

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

Revision 1: The client requested that the upper and lower reporting criteria for radiological parameters to be MDC and critical level (DLC).

### RECEIPT

The samples were received on 12/21/2015 4:50 PM; the samples arrived in good condition, properly preserved. The temperature of the cooler at receipt was 20.0° C.

### **Receipt Exceptions**

No tests were noted on CoC. No sample times were listed on CoC. No sample dates or times were listed on sample containers. SAC-05.011-012.EPADUP (160-15482-1), SAC-05.025-026.EPADUP (160-15482-2), SAC-14.025-026.EPADUP (160-15482-3), SAC-13.020-022.EPADUP (160-15482-4), SAC-10.026-028.EPADUP (160-15482-5), SAC-19.005-006.EPADUP (160-15482-6), SAC-24.004-005.EPADUP (160-15482-7), SAC-18.002-005.EPADUP (160-15482-8), SAC-25.037-038.EPADUP (160-15482-9) and SAC-23.023-024.EPADUP (160-15482-10)

### **ISOTOPIC THORIUM (ALPHA SPECTROMETRY)**

Samples SAC-05.011-012.EPADUP (160-15482-1), SAC-05.025-026.EPADUP (160-15482-2), SAC-14.025-026.EPADUP (160-15482-3),

TestAmerica St. Louis

# Case Narrative

Client: Tetra Tech EM Inc.  
Project/Site: West Lake Landfill

TestAmerica Job ID: 160-15482-1

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## Job ID: 160-15482-1 (Continued)

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### Laboratory: TestAmerica St. Louis (Continued)

SAC-13.020-022.EPADUP (160-15482-4), SAC-10.026-028.EPADUP (160-15482-5), SAC-19.005-006.EPADUP (160-15482-6), SAC-24.004-005.EPADUP (160-15482-7), SAC-18.002-005.EPADUP (160-15482-8), SAC-25.037-038.EPADUP (160-15482-9) and SAC-23.023-024.EPADUP (160-15482-10) were analyzed for Isotopic Thorium (Alpha Spectrometry) in accordance with DOE A01R\_Th. The samples were dried on 12/22/2015, prepared on 01/20/2016 and analyzed on 01/25/2016.

#### Prep Batch 231156

The following samples could not be thoroughly homogenized before sub-sampling was performed due to sample matrix:

SAC-05.011-012.EPADUP (160-15482-1), SAC-05.025-026.EPADUP (160-15482-2), SAC-14.025-026.EPADUP (160-15482-3), SAC-13.020-022.EPADUP (160-15482-4), SAC-10.026-028.EPADUP (160-15482-5), SAC-19.005-006.EPADUP (160-15482-6), SAC-24.004-005.EPADUP (160-15482-7), SAC-18.002-005.EPADUP (160-15482-8), SAC-25.037-038.EPADUP (160-15482-9) and SAC-23.023-024.EPADUP (160-15482-10). The samples contain rocks.

#### Prep Batch 233359

The detection goal was not met for the following samples due to a reduction of sample size attributed to high activity: dilutions were performed on these samples SAC-13.020-022.EPADUP (160-15482-4), SAC-19.005-006.EPADUP (160-15482-6), SAC-24.004-005.EPADUP (160-15482-7), SAC-18.002-005.EPADUP (160-15482-8) and SAC-23.023-024.EPADUP (160-15482-10). Analytical results are reported with the detection limit achieved.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

### ISOTOPIC URANIUM (ALPHA SPECTROMETRY)

Samples SAC-05.011-012.EPADUP (160-15482-1), SAC-05.025-026.EPADUP (160-15482-2), SAC-14.025-026.EPADUP (160-15482-3), SAC-13.020-022.EPADUP (160-15482-4), SAC-10.026-028.EPADUP (160-15482-5), SAC-19.005-006.EPADUP (160-15482-6), SAC-24.004-005.EPADUP (160-15482-7), SAC-18.002-005.EPADUP (160-15482-8), SAC-25.037-038.EPADUP (160-15482-9) and SAC-23.023-024.EPADUP (160-15482-10) were analyzed for Isotopic Uranium (Alpha Spectrometry) in accordance with DOE. The samples were dried on 12/22/2015, prepared on 01/07/2016 and 01/21/2016 and analyzed on 01/13/2016 and 01/26/2016.

#### Prep Batch 231168

The following samples could not be thoroughly homogenized before sub-sampling was performed due to sample matrix:

SAC-05.011-012.EPADUP (160-15482-1), SAC-05.025-026.EPADUP (160-15482-2), SAC-14.025-026.EPADUP (160-15482-3), SAC-13.020-022.EPADUP (160-15482-4), SAC-10.026-028.EPADUP (160-15482-5), SAC-19.005-006.EPADUP (160-15482-6), SAC-24.004-005.EPADUP (160-15482-7), SAC-18.002-005.EPADUP (160-15482-8), SAC-25.037-038.EPADUP (160-15482-9) and SAC-23.023-024.EPADUP (160-15482-10). The samples contain rocks.

#### Prep Batch 233547

The sample was re-prepped with a 1:15 dilution, due to high activity: SAC-18.002-005.EPADUP (160-15482-8).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

### RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Samples SAC-05.011-012.EPADUP (160-15482-1), SAC-05.025-026.EPADUP (160-15482-2), SAC-14.025-026.EPADUP (160-15482-3), SAC-13.020-022.EPADUP (160-15482-4), SAC-10.026-028.EPADUP (160-15482-5), SAC-19.005-006.EPADUP (160-15482-6), SAC-24.004-005.EPADUP (160-15482-7), SAC-18.002-005.EPADUP (160-15482-8), SAC-25.037-038.EPADUP (160-15482-9) and SAC-23.023-024.EPADUP (160-15482-10) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA\_01\_R. The samples were dried on 12/22/2015, prepared on 12/23/2015 and analyzed on 01/13/2016.

The detection goal for radium-226 was not met for the following samples due to high activity: SAC-19.005-006.EPADUP (160-15482-6), SAC-24.004-005.EPADUP (160-15482-7) and SAC-18.002-005.EPADUP (160-15482-8). Analytical results are reported with the detection limit achieved.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

**CHAIN OF CUSTODY RECORD  
ENVIRONMENTAL PROTECTION AGENCY REGION VII**

|   |   |   |                 |
|---|---|---|-----------------|
| ACTIVITY LEADER(Print)<br><i>Tom Mahler</i> | NAME OF SURVEY OR ACTIVITY<br><i>Additional Characterization-EPADUP</i> | DATE OF COLLECTION<br><i>21</i> / <i>12</i> / <i>15</i><br>DAY MONTH YEAR | SHEET<br>1 of 1 |
|---|---|---|-----------------|

CONTENTS OF SHIPMENT *1 cooler with 10 samples Quota # 16004952 (Contact Emily Fisher-Tetra Tech for 7)*

| SAMPLE NUMBER                | TYPE OF CONTAINERS                      |                               |        |        |                         | SAMPLED MEDIA |          |          |      |       | RECEIVING LABORATORY<br>REMARKS/OTHER INFORMATION<br>(condition of samples upon receipt,<br>other sample numbers, etc.) |
|------------------------------|---|-------------------------------|--------|--------|-------------------------|---------------|----------|----------|------|-------|---|
|                              | CUBITAINER                              | <i>Zip-lock bag</i><br>BOTTLE | BOTTLE | BOTTLE | VOA SET<br>(2 VIALS EA) | water         | soil     | sediment | slud | other |   |
|                              | NUMBERS OF CONTAINERS PER SAMPLE NUMBER |                               |        |        |                         |               |          |          |      |       |   |
| <i>SAC-05.01-012.EPADUP</i>  |   | <i>1</i>                      |        |        |                         |               | <i>X</i> |          |      |       |   |
| <i>SAC-05.015-016.EPADUP</i> |   | <i>1</i>                      |        |        |                         |               | <i>X</i> |          |      |       |   |
| <i>SAC-14.025-026.EPADUP</i> |   | <i>1</i>                      |        |        |                         |               | <i>X</i> |          |      |       |   |
| <i>SAC-13.020-022.EPADUP</i> |   | <i>1</i>                      |        |        |                         |               | <i>X</i> |          |      |       |   |
| <i>SAC-10.026-028.EPADUP</i> |   | <i>1</i>                      |        |        |                         |               | <i>X</i> |          |      |       |   |
| <i>SAC-17.005-006.EPADUP</i> |   | <i>1</i>                      |        |        |                         |               | <i>X</i> |          |      |       |   |
| <i>SAC-14.004-005.EPADUP</i> |   | <i>1</i>                      |        |        |                         |               | <i>X</i> |          |      |       |   |
| <i>SAC-18.002-005.EPADUP</i> |   | <i>1</i>                      |        |        |                         |               | <i>X</i> |          |      |       |   |
| <i>SAC-25.037-038.EPADUP</i> |   | <i>1</i>                      |        |        |                         |               | <i>X</i> |          |      |       |   |
| <i>SAC-73.023-024.EPADUP</i> |   | <i>1</i>                      |        |        |                         |               | <i>X</i> |          |      |       |   |



|   |   |
|---|---|
| DESCRIPTION OF SHIPMENT<br>____ PIECE(S) CONSISTING OF ____ BOX(ES)<br><i>1</i> ICE CHEST(S); OTHER _____ | MODE OF SHIPMENT<br>____ COMMERCIAL CARRIER: _____<br>____ COURIER<br>____ SAMPLER CONVEYED<br>(SHIPPING DOCUMENT NUMBER) |
|---|---|

| PERSONNEL CUSTODY RECORD   |                         |                     |  |   |
|--|-------------------------|---------------------|--|---|
| RELINQUISHED BY (SAMPLER)<br><i>Mattif...</i>                                | DATE<br><i>12/21/15</i> | TIME<br><i>1545</i> | RECEIVED BY<br><i>Tom Mahler</i>   | REASON FOR CHANGE OF CUSTODY<br><i>Turned over to EPA for Laboratory Analysis</i> |
| <input type="checkbox"/> SEALED <input checked="" type="checkbox"/> UNSEALED |                         |                     | <input type="checkbox"/> SEALED <input checked="" type="checkbox"/> UNSEALED |   |
| RELINQUISHED BY<br><i>Tom Mahler</i>   | DATE<br><i>12/21/15</i> | TIME<br><i>1650</i> | RECEIVED BY<br><i>Jim Beach</i>  | REASON FOR CHANGE OF CUSTODY<br><i>12.21.15 1650</i>                              |
| <input type="checkbox"/> SEALED <input checked="" type="checkbox"/> UNSEALED |                         |                     | <input type="checkbox"/> SEALED <input checked="" type="checkbox"/> UNSEALED |   |
| RELINQUISHED BY  | DATE                    | TIME                | RECEIVED BY  | REASON FOR CHANGE OF CUSTODY  |
| <input type="checkbox"/> SEALED <input type="checkbox"/> UNSEALED            |                         |                     | <input type="checkbox"/> SEALED <input type="checkbox"/> UNSEALED            |   |

## Login Sample Receipt Checklist

Client: Tetra Tech EM Inc.

Job Number: 160-15482-1

**Login Number: 15482**

**List Source: TestAmerica St. Louis**

**List Number: 1**

**Creator: Clarke, Jill C**

| Question  | Answer | Comment   |
|---|--------|---|
| Radioactivity wasn't checked or is <math>\leq</math> background as measured by a survey meter.      | True   |   |
| The cooler's custody seal, if present, is intact.   | N/A    |   |
| Sample custody seals, if present, are intact.   | N/A    |   |
| The cooler or samples do not appear to have been compromised or tampered with.                      | True   |   |
| Samples were received on ice.   | N/A    |   |
| Cooler Temperature is acceptable.   | True   |   |
| Cooler Temperature is recorded.   | True   |   |
| COC is present.   | True   |   |
| COC is filled out in ink and legible.   | False  | No test are noted on CoC. No Sample times listed on CoC.                      |
| COC is filled out with all pertinent information.   | False  | No sample times listed on CoC.  |
| Is the Field Sampler's name present on COC?   | N/A    |   |
| There are no discrepancies between the containers received and the COC.                             | True   |   |
| Samples are received within Holding Time.   | True   |   |
| Sample containers have legible labels.  | True   |   |
| Containers are not broken or leaking.   | True   |   |
| Sample collection date/times are provided.  | False  | No sample times listed on CoC. No sample dates or times listed on containers. |
| Appropriate sample containers are used.   | True   |   |
| Sample bottles are completely filled.   | True   |   |
| Sample Preservation Verified.   | True   |   |
| There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs                    | True   |   |
| Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4"). | N/A    |   |
| Multiphasic samples are not present.  | True   |   |
| Samples do not require splitting or compositing.  | True   |   |
| Residual Chlorine Checked.  | N/A    |   |

# Definitions/Glossary

Client: Tetra Tech EM Inc.  
Project/Site: West Lake Landfill

TestAmerica Job ID: 160-15482-1

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## Qualifiers

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### Rad

| Qualifier | Qualifier Description                           |
|-----------|---|
| U         | Result is less than the sample detection limit. |

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## Glossary

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| Abbreviation   | These commonly used abbreviations may or may not be present in this report.                                 |
|----------------|---|
| α              | Listed under the "D" column to designate that the result is reported on a dry weight basis                  |
| %R             | Percent Recovery  |
| CFL            | Contains Free Liquid  |
| CNF            | Contains no Free Liquid   |
| DER            | Duplicate error ratio (normalized absolute difference)  |
| Dil Fac        | Dilution Factor   |
| DL, RA, RE, IN | Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample |
| DLC            | Decision level concentration  |
| MDA            | Minimum detectable activity   |
| EDL            | Estimated Detection Limit   |
| MDC            | Minimum detectable concentration  |
| MDL            | Method Detection Limit  |
| ML             | Minimum Level (Dioxin)  |
| NC             | Not Calculated  |
| ND             | Not detected at the reporting limit (or MDL or EDL if shown)  |
| PQL            | Practical Quantitation Limit  |
| QC             | Quality Control   |
| RER            | Relative error ratio  |
| RL             | Reporting Limit or Requested Limit (Radiochemistry)   |
| RPD            | Relative Percent Difference, a measure of the relative difference between two points                        |
| TEF            | Toxicity Equivalent Factor (Dioxin)   |
| TEQ            | Toxicity Equivalent Quotient (Dioxin)   |

# Method Summary

Client: Tetra Tech EM Inc.  
Project/Site: West Lake Landfill

TestAmerica Job ID: 160-15482-1

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| <b>Method</b> | <b>Method Description</b>              | <b>Protocol</b> | <b>Laboratory</b> |
|---------------|--|-----------------|-------------------|
| A-01-R        | Isotopic Uranium (Alpha Spectrometry)  | DOE             | TAL SL            |
| A-01-R        | Isotopic Thorium (Alpha Spectrometry)  | DOE             | TAL SL            |
| GA-01-R       | Radium-226 & Other Gamma Emitters (GS) | DOE             | TAL SL            |

**Protocol References:**

DOE = U.S. Department of Energy

**Laboratory References:**

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

TestAmerica St. Louis

# Sample Summary

Client: Tetra Tech EM Inc.  
Project/Site: West Lake Landfill

TestAmerica Job ID: 160-15482-1

| Lab Sample ID | Client Sample ID      | Matrix | Collected      | Received       |
|---------------|-----------------------|--------|----------------|----------------|
| 160-15482-1   | SAC-05.011-012.EPADUP | Solid  | 12/21/15 00:00 | 12/21/15 16:50 |
| 160-15482-2   | SAC-05.025-026.EPADUP | Solid  | 12/21/15 00:00 | 12/21/15 16:50 |
| 160-15482-3   | SAC-14.025-026.EPADUP | Solid  | 12/21/15 00:00 | 12/21/15 16:50 |
| 160-15482-4   | SAC-13.020-022.EPADUP | Solid  | 12/21/15 00:00 | 12/21/15 16:50 |
| 160-15482-5   | SAC-10.026-028.EPADUP | Solid  | 12/21/15 00:00 | 12/21/15 16:50 |
| 160-15482-6   | SAC-19.005-006.EPADUP | Solid  | 12/21/15 00:00 | 12/21/15 16:50 |
| 160-15482-7   | SAC-24.004-005.EPADUP | Solid  | 12/21/15 00:00 | 12/21/15 16:50 |
| 160-15482-8   | SAC-18.002-005.EPADUP | Solid  | 12/21/15 00:00 | 12/21/15 16:50 |
| 160-15482-9   | SAC-25.037-038.EPADUP | Solid  | 12/21/15 00:00 | 12/21/15 16:50 |
| 160-15482-10  | SAC-23.023-024.EPADUP | Solid  | 12/21/15 00:00 | 12/21/15 16:50 |

TestAmerica St. Louis

# Client Sample Results

Client: Tetra Tech EM Inc.  
Project/Site: West Lake Landfill

TestAmerica Job ID: 160-15482-1

**Client Sample ID: SAC-05.011-012.EPADUP**

**Lab Sample ID: 160-15482-1**

Date Collected: 12/21/15 00:00

Matrix: Solid

Date Received: 12/21/15 16:50

**Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)**

| Analyte     | Result | Qualifier | Count    | Total   | MDC    | DLC     | Unit  | Prepared       | Analyzed       | Dil Fac |
|-------------|--------|-----------|----------|---------|--------|---------|-------|----------------|----------------|---------|
|             |        |           | Uncert.  | Uncert. |        |         |       |                |                |         |
|             |        |           | (2σ+/-)  | (2σ+/-) |        |         |       |                |                |         |
| Thorium-228 | 0.863  |           | 0.167    | 0.182   | 0.0712 | 0.0239  | pCi/g | 01/20/16 13:45 | 01/25/16 12:54 | 1       |
| Thorium-230 | 2.55   |           | 0.283    | 0.355   | 0.0235 | 0.00720 | pCi/g | 01/20/16 13:45 | 01/25/16 12:54 | 1       |
| Thorium-232 | 0.756  |           | 0.153    | 0.166   | 0.0234 | 0.00717 | pCi/g | 01/20/16 13:45 | 01/25/16 12:54 | 1       |
| Tracer      | %Yield | Qualifier | Limits   |         |        |         |       | Prepared       | Analyzed       | Dil Fac |
| Thorium-229 | 95.8   |           | 30 - 110 |         |        |         |       | 01/20/16 13:45 | 01/25/16 12:54 | 1       |

**Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)**

| Analyte         | Result | Qualifier | Count    | Total   | MDC    | DLC     | Unit  | Prepared       | Analyzed       | Dil Fac |
|-----------------|--------|-----------|----------|---------|--------|---------|-------|----------------|----------------|---------|
|                 |        |           | Uncert.  | Uncert. |        |         |       |                |                |         |
|                 |        |           | (2σ+/-)  | (2σ+/-) |        |         |       |                |                |         |
| Uranium-233/234 | 0.616  |           | 0.146    | 0.155   | 0.0527 | 0.0136  | pCi/g | 01/07/16 14:03 | 01/13/16 16:49 | 1       |
| Uranium-235/236 | 0.0637 |           | 0.0520   | 0.0523  | 0.0318 | 0.00976 | pCi/g | 01/07/16 14:03 | 01/13/16 16:49 | 1       |
| Uranium-238     | 0.636  |           | 0.147    | 0.157   | 0.0412 | 0.00783 | pCi/g | 01/07/16 14:03 | 01/13/16 16:49 | 1       |
| Tracer          | %Yield | Qualifier | Limits   |         |        |         |       | Prepared       | Analyzed       | Dil Fac |
| Uranium-232     | 85.1   |           | 30 - 110 |         |        |         |       | 01/07/16 14:03 | 01/13/16 16:49 | 1       |

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

| Analyte                      | Result | Qualifier | Count   | Total   | MDC    | DLC    | Unit  | Prepared       | Analyzed       | Dil Fac |
|------------------------------|--------|-----------|---------|---------|--------|--------|-------|----------------|----------------|---------|
|                              |        |           | Uncert. | Uncert. |        |        |       |                |                |         |
|                              |        |           | (2σ+/-) | (2σ+/-) |        |        |       |                |                |         |
| Actinium-227                 | 0.590  |           | 0.715   | 0.718   | 1.17   | 0.544  | pCi/g | 12/23/15 10:44 | 01/13/16 07:29 | 1       |
| Actinium 228                 | 1.31   |           | 0.305   | 0.333   | 0.290  | 0.113  | pCi/g | 12/23/15 10:44 | 01/13/16 07:29 | 1       |
| Bismuth-212                  | 2.45   |           | 0.854   | 0.891   | 0.548  | 0.173  | pCi/g | 12/23/15 10:44 | 01/13/16 07:29 | 1       |
| Bismuth-214                  | 1.32   |           | 0.260   | 0.294   | 0.177  | 0.0742 | pCi/g | 12/23/15 10:44 | 01/13/16 07:29 | 1       |
| Lead-210                     | 4.02   |           | 2.22    | 2.27    | 2.78   | 1.30   | pCi/g | 12/23/15 10:44 | 01/13/16 07:29 | 1       |
| Lead-212                     | 0.933  |           | 0.180   | 0.217   | 0.175  | 0.0807 | pCi/g | 12/23/15 10:44 | 01/13/16 07:29 | 1       |
| Lead-214                     | 1.33   |           | 0.228   | 0.267   | 0.223  | 0.101  | pCi/g | 12/23/15 10:44 | 01/13/16 07:29 | 1       |
| Potassium-40                 | 15.3   |           | 2.42    | 2.88    | 0.900  | 0.322  | pCi/g | 12/23/15 10:44 | 01/13/16 07:29 | 1       |
| Protactinium-231             | 0.454  | U         | 1.15    | 1.15    | 2.80   | 1.27   | pCi/g | 12/23/15 10:44 | 01/13/16 07:29 | 1       |
| Radium-226                   | 1.32   |           | 0.260   | 0.294   | 0.177  | 0.0742 | pCi/g | 12/23/15 10:44 | 01/13/16 07:29 | 1       |
| Radium-228                   | 1.31   |           | 0.305   | 0.333   | 0.290  | 0.113  | pCi/g | 12/23/15 10:44 | 01/13/16 07:29 | 1       |
| Thorium-232                  | 1.31   |           | 0.305   | 0.333   | 0.290  | 0.113  | pCi/g | 12/23/15 10:44 | 01/13/16 07:29 | 1       |
| Thorium-234                  | 0.822  | U         | 0.833   | 0.837   | 2.38   | 1.12   | pCi/g | 12/23/15 10:44 | 01/13/16 07:29 | 1       |
| Thallium-208                 | 0.426  |           | 0.107   | 0.116   | 0.0664 | 0.0257 | pCi/g | 12/23/15 10:44 | 01/13/16 07:29 | 1       |
| Uranium-235                  | 0.269  | U         | 0.358   | 0.359   | 0.645  | 0.304  | pCi/g | 12/23/15 10:44 | 01/13/16 07:29 | 1       |
| Uranium-238                  | 0.822  | U         | 0.833   | 0.837   | 2.38   | 1.12   | pCi/g | 12/23/15 10:44 | 01/13/16 07:29 | 1       |
| Other Detected Radionuclides | Result | Qualifier | Count   | Total   | MDC    | DLC    | Unit  | Prepared       | Analyzed       | Dil Fac |
| Other Detected Radionuclide  | None   |           | Uncert. | Uncert. |        |        | pCi/g | 12/23/15 10:44 | 01/13/16 07:29 | 1       |
|                              |        |           | (2σ+/-) | (2σ+/-) |        |        |       |                |                |         |

TestAmerica St. Louis

# Client Sample Results

Client: Tetra Tech EM Inc.  
Project/Site: West Lake Landfill

TestAmerica Job ID: 160-15482-1

**Client Sample ID: SAC-05.025-026.EPADUP**

**Lab Sample ID: 160-15482-2**

Date Collected: 12/21/15 00:00

Matrix: Solid

Date Received: 12/21/15 16:50

**Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)**

| Analyte       | Result        | Qualifier        | Count         | Total   | MDC    | DLC     | Unit  | Prepared        | Analyzed        | Dil Fac        |
|---------------|---------------|------------------|---------------|---------|--------|---------|-------|-----------------|-----------------|----------------|
|               |               |                  | Uncert.       | Uncert. |        |         |       |                 |                 |                |
|               |               |                  | (2σ+/-)       | (2σ+/-) |        |         |       |                 |                 |                |
| Thorium-228   | 0.916         |                  | 0.172         | 0.188   | 0.0753 | 0.0260  | pCi/g | 01/20/16 13:45  | 01/25/16 12:54  | 1              |
| Thorium-230   | 0.934         |                  | 0.171         | 0.188   | 0.0436 | 0.0101  | pCi/g | 01/20/16 13:45  | 01/25/16 12:54  | 1              |
| Thorium-232   | 0.922         |                  | 0.169         | 0.186   | 0.0232 | 0.00713 | pCi/g | 01/20/16 13:45  | 01/25/16 12:54  | 1              |
| <b>Tracer</b> | <b>%Yield</b> | <b>Qualifier</b> | <b>Limits</b> |         |        |         |       | <b>Prepared</b> | <b>Analyzed</b> | <b>Dil Fac</b> |
| Thorium-229   | 92.9          |                  | 30 - 110      |         |        |         |       | 01/20/16 13:45  | 01/25/16 12:54  | 1              |

**Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)**

| Analyte         | Result        | Qualifier        | Count         | Total   | MDC    | DLC     | Unit  | Prepared        | Analyzed        | Dil Fac        |
|-----------------|---------------|------------------|---------------|---------|--------|---------|-------|-----------------|-----------------|----------------|
|                 |               |                  | Uncert.       | Uncert. |        |         |       |                 |                 |                |
|                 |               |                  | (2σ+/-)       | (2σ+/-) |        |         |       |                 |                 |                |
| Uranium-233/234 | 0.440         |                  | 0.122         | 0.127   | 0.0512 | 0.0132  | pCi/g | 01/07/16 14:03  | 01/13/16 16:49  | 1              |
| Uranium-235/236 | 0.0103        |                  | 0.0206        | 0.0206  | 0.0309 | 0.00947 | pCi/g | 01/07/16 14:03  | 01/13/16 16:49  | 1              |
| Uranium-238     | 0.568         |                  | 0.137         | 0.145   | 0.0400 | 0.00759 | pCi/g | 01/07/16 14:03  | 01/13/16 16:49  | 1              |
| <b>Tracer</b>   | <b>%Yield</b> | <b>Qualifier</b> | <b>Limits</b> |         |        |         |       | <b>Prepared</b> | <b>Analyzed</b> | <b>Dil Fac</b> |
| Uranium-232     | 88.5          |                  | 30 - 110      |         |        |         |       | 01/07/16 14:03  | 01/13/16 16:49  | 1              |

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

| Analyte                             | Result        | Qualifier        | Count          | Total          | MDC        | DLC        | Unit        | Prepared        | Analyzed        | Dil Fac        |
|-------------------------------------|---------------|------------------|----------------|----------------|------------|------------|-------------|-----------------|-----------------|----------------|
|                                     |               |                  | Uncert.        | Uncert.        |            |            |             |                 |                 |                |
|                                     |               |                  | (2σ+/-)        | (2σ+/-)        |            |            |             |                 |                 |                |
| Actinium-227                        | 0.0541        | U                | 0.597          | 0.597          | 1.04       | 0.488      | pCi/g       | 12/23/15 10:44  | 01/13/16 07:28  | 1              |
| Actinium 228                        | 0.852         |                  | 0.195          | 0.213          | 0.134      | 0.0494     | pCi/g       | 12/23/15 10:44  | 01/13/16 07:28  | 1              |
| Bismuth-212                         | 0.682         |                  | 0.687          | 0.690          | 1.10       | 0.492      | pCi/g       | 12/23/15 10:44  | 01/13/16 07:28  | 1              |
| Bismuth-214                         | 0.738         |                  | 0.184          | 0.199          | 0.168      | 0.0758     | pCi/g       | 12/23/15 10:44  | 01/13/16 07:28  | 1              |
| Lead-210                            | -0.0360       | U                | 1.37           | 1.37           | 2.33       | 1.10       | pCi/g       | 12/23/15 10:44  | 01/13/16 07:28  | 1              |
| Lead-212                            | 0.843         |                  | 0.147          | 0.183          | 0.137      | 0.0638     | pCi/g       | 12/23/15 10:44  | 01/13/16 07:28  | 1              |
| Lead-214                            | 0.871         |                  | 0.148          | 0.174          | 0.137      | 0.0618     | pCi/g       | 12/23/15 10:44  | 01/13/16 07:28  | 1              |
| Potassium-40                        | 13.7          |                  | 1.70           | 2.20           | 0.906      | 0.384      | pCi/g       | 12/23/15 10:44  | 01/13/16 07:28  | 1              |
| Protactinium-231                    | 0.300         | U                | 0.271          | 0.273          | 2.34       | 1.09       | pCi/g       | 12/23/15 10:44  | 01/13/16 07:28  | 1              |
| Radium-226                          | 0.738         |                  | 0.184          | 0.199          | 0.168      | 0.0758     | pCi/g       | 12/23/15 10:44  | 01/13/16 07:28  | 1              |
| Radium-228                          | 0.852         |                  | 0.195          | 0.213          | 0.134      | 0.0494     | pCi/g       | 12/23/15 10:44  | 01/13/16 07:28  | 1              |
| Thorium-232                         | 0.852         |                  | 0.195          | 0.213          | 0.134      | 0.0494     | pCi/g       | 12/23/15 10:44  | 01/13/16 07:28  | 1              |
| Thorium-234                         | 0.927         |                  | 0.563          | 0.571          | 1.67       | 0.789      | pCi/g       | 12/23/15 10:44  | 01/13/16 07:28  | 1              |
| Thallium-208                        | 0.362         |                  | 0.0829         | 0.0910         | 0.0709     | 0.0311     | pCi/g       | 12/23/15 10:44  | 01/13/16 07:28  | 1              |
| Uranium-235                         | 0.0304        | U                | 0.197          | 0.197          | 0.466      | 0.220      | pCi/g       | 12/23/15 10:44  | 01/13/16 07:28  | 1              |
| Uranium-238                         | 0.927         |                  | 0.563          | 0.571          | 1.67       | 0.789      | pCi/g       | 12/23/15 10:44  | 01/13/16 07:28  | 1              |
| <b>Other Detected Radionuclides</b> |               |                  | <b>Count</b>   | <b>Total</b>   |            |            |             |                 |                 |                |
|                                     |               |                  | <b>Uncert.</b> | <b>Uncert.</b> |            |            |             |                 |                 |                |
|                                     |               |                  | (2σ+/-)        | (2σ+/-)        |            |            |             |                 |                 |                |
| <b>Other Detected Radionuclide</b>  | <b>Result</b> | <b>Qualifier</b> |                |                | <b>MDC</b> | <b>DLC</b> | <b>Unit</b> | <b>Prepared</b> | <b>Analyzed</b> | <b>Dil Fac</b> |
| Other Detected Radionuclide         | None          |                  |                |                |            |            | pCi/g       | 12/23/15 10:44  | 01/13/16 07:28  | 1              |

TestAmerica St. Louis

# Client Sample Results

Client: Tetra Tech EM Inc.  
Project/Site: West Lake Landfill

TestAmerica Job ID: 160-15482-1

**Client Sample ID: SAC-14.025-026.EPADUP**

**Lab Sample ID: 160-15482-3**

Date Collected: 12/21/15 00:00

Matrix: Solid

Date Received: 12/21/15 16:50

**Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)**

| Analyte       | Result        | Qualifier        | Count         | Total   | MDC    | DLC     | Unit  | Prepared        | Analyzed        | Dil Fac        |
|---------------|---------------|------------------|---------------|---------|--------|---------|-------|-----------------|-----------------|----------------|
|               |               |                  | Uncert.       | Uncert. |        |         |       |                 |                 |                |
|               |               |                  | (2σ+/-)       | (2σ+/-) |        |         |       |                 |                 |                |
| Thorium-228   | 0.418         |                  | 0.120         | 0.125   | 0.0798 | 0.0281  | pCi/g | 01/20/16 13:45  | 01/25/16 12:54  | 1              |
| Thorium-230   | 0.502         |                  | 0.126         | 0.133   | 0.0236 | 0.00724 | pCi/g | 01/20/16 13:45  | 01/25/16 12:54  | 1              |
| Thorium-232   | 0.396         |                  | 0.112         | 0.117   | 0.0439 | 0.0102  | pCi/g | 01/20/16 13:45  | 01/25/16 12:54  | 1              |
| <b>Tracer</b> | <b>%Yield</b> | <b>Qualifier</b> | <b>Limits</b> |         |        |         |       | <b>Prepared</b> | <b>Analyzed</b> | <b>Dil Fac</b> |
| Thorium-229   | 92.7          |                  | 30 - 110      |         |        |         |       | 01/20/16 13:45  | 01/25/16 12:54  | 1              |

**Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)**

| Analyte         | Result        | Qualifier        | Count         | Total   | MDC    | DLC    | Unit  | Prepared        | Analyzed        | Dil Fac        |
|-----------------|---------------|------------------|---------------|---------|--------|--------|-------|-----------------|-----------------|----------------|
|                 |               |                  | Uncert.       | Uncert. |        |        |       |                 |                 |                |
|                 |               |                  | (2σ+/-)       | (2σ+/-) |        |        |       |                 |                 |                |
| Uranium-233/234 | 0.360         |                  | 0.111         | 0.115   | 0.0515 | 0.0133 | pCi/g | 01/07/16 14:03  | 01/13/16 16:49  | 1              |
| Uranium-235/236 | -0.00518      | U                | 0.00733       | 0.00734 | 0.0580 | 0.0135 | pCi/g | 01/07/16 14:03  | 01/13/16 16:49  | 1              |
| Uranium-238     | 0.343         |                  | 0.108         | 0.112   | 0.0514 | 0.0132 | pCi/g | 01/07/16 14:03  | 01/13/16 16:49  | 1              |
| <b>Tracer</b>   | <b>%Yield</b> | <b>Qualifier</b> | <b>Limits</b> |         |        |        |       | <b>Prepared</b> | <b>Analyzed</b> | <b>Dil Fac</b> |
| Uranium-232     | 88.3          |                  | 30 - 110      |         |        |        |       | 01/07/16 14:03  | 01/13/16 16:49  | 1              |

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

| Analyte                             | Result | Qualifier | Count   | Total   | MDC    | DLC    | Unit  | Prepared       | Analyzed       | Dil Fac |
|-------------------------------------|--------|-----------|---------|---------|--------|--------|-------|----------------|----------------|---------|
|                                     |        |           | Uncert. | Uncert. |        |        |       |                |                |         |
|                                     |        |           | (2σ+/-) | (2σ+/-) |        |        |       |                |                |         |
| Actinium-227                        | 0.0568 | U         | 0.624   | 0.624   | 1.08   | 0.511  | pCi/g | 12/23/15 10:44 | 01/13/16 08:17 | 1       |
| Actinium 228                        | 0.479  |           | 0.172   | 0.179   | 0.117  | 0.0369 | pCi/g | 12/23/15 10:44 | 01/13/16 08:17 | 1       |
| Bismuth-212                         | 0.403  | U         | 0.597   | 0.599   | 1.00   | 0.433  | pCi/g | 12/23/15 10:44 | 01/13/16 08:17 | 1       |
| Bismuth-214                         | 0.492  |           | 0.121   | 0.132   | 0.0843 | 0.0325 | pCi/g | 12/23/15 10:44 | 01/13/16 08:17 | 1       |
| Lead-210                            | 0.362  | U         | 1.33    | 1.33    | 2.28   | 1.07   | pCi/g | 12/23/15 10:44 | 01/13/16 08:17 | 1       |
| Lead-212                            | 0.521  |           | 0.105   | 0.125   | 0.0962 | 0.0433 | pCi/g | 12/23/15 10:44 | 01/13/16 08:17 | 1       |
| Lead-214                            | 0.420  |           | 0.105   | 0.114   | 0.128  | 0.0565 | pCi/g | 12/23/15 10:44 | 01/13/16 08:17 | 1       |
| Potassium-40                        | 14.8   |           | 1.96    | 2.48    | 0.713  | 0.269  | pCi/g | 12/23/15 10:44 | 01/13/16 08:17 | 1       |
| Protactinium-231                    | 0.0420 | U         | 0.113   | 0.113   | 2.02   | 0.924  | pCi/g | 12/23/15 10:44 | 01/13/16 08:17 | 1       |
| Radium-226                          | 0.492  |           | 0.121   | 0.132   | 0.0843 | 0.0325 | pCi/g | 12/23/15 10:44 | 01/13/16 08:17 | 1       |
| Radium-228                          | 0.479  |           | 0.172   | 0.179   | 0.117  | 0.0369 | pCi/g | 12/23/15 10:44 | 01/13/16 08:17 | 1       |
| Thorium-232                         | 0.479  |           | 0.172   | 0.179   | 0.117  | 0.0369 | pCi/g | 12/23/15 10:44 | 01/13/16 08:17 | 1       |
| Thorium-234                         | 1.68   |           | 1.36    | 1.37    | 1.78   | 0.840  | pCi/g | 12/23/15 10:44 | 01/13/16 08:17 | 1       |
| Thallium-208                        | 0.119  |           | 0.0558  | 0.0571  | 0.0650 | 0.0274 | pCi/g | 12/23/15 10:44 | 01/13/16 08:17 | 1       |
| Uranium-235                         | 0.294  |           | 0.254   | 0.256   | 0.428  | 0.201  | pCi/g | 12/23/15 10:44 | 01/13/16 08:17 | 1       |
| Uranium-238                         | 1.68   |           | 1.36    | 1.37    | 1.78   | 0.840  | pCi/g | 12/23/15 10:44 | 01/13/16 08:17 | 1       |
| <b>Other Detected Radionuclides</b> |        |           | Count   | Total   |        |        |       |                |                |         |
|                                     |        |           | Uncert. | Uncert. |        |        |       |                |                |         |
|                                     |        |           | (2σ+/-) | (2σ+/-) | MDC    | DLC    | Unit  | Prepared       | Analyzed       | Dil Fac |
| Other Detected Radionuclide         | None   |           |         |         |        |        | pCi/g | 12/23/15 10:44 | 01/13/16 08:17 | 1       |

TestAmerica St. Louis

# Client Sample Results

Client: Tetra Tech EM Inc.  
Project/Site: West Lake Landfill

TestAmerica Job ID: 160-15482-1

**Client Sample ID: SAC-13.020-022.EPADUP**

**Lab Sample ID: 160-15482-4**

Date Collected: 12/21/15 00:00

Matrix: Solid

Date Received: 12/21/15 16:50

**Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)**

| Analyte       | Result        | Qualifier        | Count         | Total   | MDC  | DLC   | Unit  | Prepared        | Analyzed        | Dil Fac        |
|---------------|---------------|------------------|---------------|---------|------|-------|-------|-----------------|-----------------|----------------|
|               |               |                  | Uncert.       | Uncert. |      |       |       |                 |                 |                |
|               |               |                  | (2σ+/-)       | (2σ+/-) |      |       |       |                 |                 |                |
| Thorium-228   | 1.31          |                  | 1.64          | 1.64    | 2.66 | 0.916 | pCi/g | 01/20/16 13:45  | 01/25/16 12:54  | 1              |
| Thorium-230   | 128           |                  | 11.9          | 16.1    | 1.34 | 0.254 | pCi/g | 01/20/16 13:45  | 01/25/16 12:54  | 1              |
| Thorium-232   | 0.169         | U                | 0.576         | 0.576   | 1.45 | 0.314 | pCi/g | 01/20/16 13:45  | 01/25/16 12:54  | 1              |
| <b>Tracer</b> | <b>%Yield</b> | <b>Qualifier</b> | <b>Limits</b> |         |      |       |       | <b>Prepared</b> | <b>Analyzed</b> | <b>Dil Fac</b> |
| Thorium-229   | 107           |                  | 30 - 110      |         |      |       |       | 01/20/16 13:45  | 01/25/16 12:54  | 1              |

**Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)**

| Analyte         | Result        | Qualifier        | Count         | Total   | MDC    | DLC     | Unit  | Prepared        | Analyzed        | Dil Fac        |
|-----------------|---------------|------------------|---------------|---------|--------|---------|-------|-----------------|-----------------|----------------|
|                 |               |                  | Uncert.       | Uncert. |        |         |       |                 |                 |                |
|                 |               |                  | (2σ+/-)       | (2σ+/-) |        |         |       |                 |                 |                |
| Uranium-233/234 | 1.67          |                  | 0.230         | 0.269   | 0.0488 | 0.0126  | pCi/g | 01/07/16 14:03  | 01/13/16 16:49  | 1              |
| Uranium-235/236 | 0.0883        |                  | 0.0589        | 0.0594  | 0.0294 | 0.00903 | pCi/g | 01/07/16 14:03  | 01/13/16 16:49  | 1              |
| Uranium-238     | 1.73          |                  | 0.234         | 0.275   | 0.0236 | 0.00724 | pCi/g | 01/07/16 14:03  | 01/13/16 16:49  | 1              |
| <b>Tracer</b>   | <b>%Yield</b> | <b>Qualifier</b> | <b>Limits</b> |         |        |         |       | <b>Prepared</b> | <b>Analyzed</b> | <b>Dil Fac</b> |
| Uranium-232     | 96.9          |                  | 30 - 110      |         |        |         |       | 01/07/16 14:03  | 01/13/16 16:49  | 1              |

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

| Analyte                             | Result | Qualifier | Count   | Total   | MDC   | DLC    | Unit  | Prepared       | Analyzed       | Dil Fac |
|-------------------------------------|--------|-----------|---------|---------|-------|--------|-------|----------------|----------------|---------|
|                                     |        |           | Uncert. | Uncert. |       |        |       |                |                |         |
|                                     |        |           | (2σ+/-) | (2σ+/-) |       |        |       |                |                |         |
| Actinium-227                        | 1.41   |           | 0.931   | 0.944   | 2.31  | 1.08   | pCi/g | 12/23/15 10:44 | 01/13/16 14:17 | 1       |
| Actinium 228                        | 0.206  | U         | 0.312   | 0.313   | 0.691 | 0.305  | pCi/g | 12/23/15 10:44 | 01/13/16 14:17 | 1       |
| Bismuth-212                         | 0.0133 | U         | 0.949   | 0.949   | 1.83  | 0.780  | pCi/g | 12/23/15 10:44 | 01/13/16 14:17 | 1       |
| Bismuth-214                         | 4.51   |           | 0.534   | 0.710   | 0.278 | 0.120  | pCi/g | 12/23/15 10:44 | 01/13/16 14:17 | 1       |
| Lead-210                            | 12.3   |           | 4.18    | 4.42    | 4.40  | 2.05   | pCi/g | 12/23/15 10:44 | 01/13/16 14:17 | 1       |
| Lead-212                            | -0.344 | U         | 0.327   | 0.330   | 0.531 | 0.255  | pCi/g | 12/23/15 10:44 | 01/13/16 14:17 | 1       |
| Lead-214                            | 5.11   |           | 0.472   | 0.711   | 0.340 | 0.154  | pCi/g | 12/23/15 10:44 | 01/13/16 14:17 | 1       |
| Potassium-40                        | 0.841  | U         | 1.40    | 1.40    | 2.67  | 1.17   | pCi/g | 12/23/15 10:44 | 01/13/16 14:17 | 1       |
| Protactinium-231                    | 1.75   | U         | 1.79    | 1.80    | 4.20  | 1.92   | pCi/g | 12/23/15 10:44 | 01/13/16 14:17 | 1       |
| Radium-226                          | 4.51   |           | 0.534   | 0.710   | 0.278 | 0.120  | pCi/g | 12/23/15 10:44 | 01/13/16 14:17 | 1       |
| Radium-228                          | 0.206  | U         | 0.312   | 0.313   | 0.691 | 0.305  | pCi/g | 12/23/15 10:44 | 01/13/16 14:17 | 1       |
| Thorium-232                         | 0.206  | U         | 0.312   | 0.313   | 0.691 | 0.305  | pCi/g | 12/23/15 10:44 | 01/13/16 14:17 | 1       |
| Thorium-234                         | 0.900  | U         | 1.50    | 1.50    | 5.00  | 2.39   | pCi/g | 12/23/15 10:44 | 01/13/16 14:17 | 1       |
| Thallium-208                        | 0.0780 |           | 0.145   | 0.145   | 0.176 | 0.0780 | pCi/g | 12/23/15 10:44 | 01/13/16 14:17 | 1       |
| Uranium-235                         | 1.33   |           | 0.508   | 0.526   | 0.574 | 0.257  | pCi/g | 12/23/15 10:44 | 01/13/16 14:17 | 1       |
| Uranium-238                         | 0.900  | U         | 1.50    | 1.50    | 5.00  | 2.39   | pCi/g | 12/23/15 10:44 | 01/13/16 14:17 | 1       |
| <b>Other Detected Radionuclides</b> |        |           | Count   | Total   |       |        |       |                |                |         |
|                                     |        |           | Uncert. | Uncert. |       |        |       |                |                |         |
|                                     |        |           | (2σ+/-) | (2σ+/-) | MDC   | DLC    | Unit  | Prepared       | Analyzed       | Dil Fac |
| Other Detected Radionuclide         | None   |           |         |         |       |        | pCi/g | 12/23/15 10:44 | 01/13/16 14:17 | 1       |

TestAmerica St. Louis

# Client Sample Results

Client: Tetra Tech EM Inc.  
Project/Site: West Lake Landfill

TestAmerica Job ID: 160-15482-1

**Client Sample ID: SAC-10.026-028.EPADUP**

**Lab Sample ID: 160-15482-5**

Date Collected: 12/21/15 00:00

Matrix: Solid

Date Received: 12/21/15 16:50

**Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)**

| Analyte       | Result        | Qualifier        | Count         | Total   | MDC    | DLC     | Unit  | Prepared        | Analyzed        | Dil Fac        |
|---------------|---------------|------------------|---------------|---------|--------|---------|-------|-----------------|-----------------|----------------|
|               |               |                  | Uncert.       | Uncert. |        |         |       |                 |                 |                |
|               |               |                  | (2σ+/-)       | (2σ+/-) |        |         |       |                 |                 |                |
| Thorium-228   | 0.437         |                  | 0.116         | 0.122   | 0.0749 | 0.0268  | pCi/g | 01/20/16 13:45  | 01/25/16 12:54  | 1              |
| Thorium-230   | 0.783         |                  | 0.149         | 0.163   | 0.0343 | 0.00651 | pCi/g | 01/20/16 13:45  | 01/25/16 12:54  | 1              |
| Thorium-232   | 0.338         |                  | 0.0976        | 0.102   | 0.0211 | 0.00648 | pCi/g | 01/20/16 13:45  | 01/25/16 12:54  | 1              |
| <b>Tracer</b> | <b>%Yield</b> | <b>Qualifier</b> | <b>Limits</b> |         |        |         |       | <b>Prepared</b> | <b>Analyzed</b> | <b>Dil Fac</b> |
| Thorium-229   | 98.6          |                  | 30 - 110      |         |        |         |       | 01/20/16 13:45  | 01/25/16 12:54  | 1              |

**Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)**

| Analyte         | Result        | Qualifier        | Count         | Total   | MDC    | DLC     | Unit  | Prepared        | Analyzed        | Dil Fac        |
|-----------------|---------------|------------------|---------------|---------|--------|---------|-------|-----------------|-----------------|----------------|
|                 |               |                  | Uncert.       | Uncert. |        |         |       |                 |                 |                |
|                 |               |                  | (2σ+/-)       | (2σ+/-) |        |         |       |                 |                 |                |
| Uranium-233/234 | 0.408         |                  | 0.113         | 0.118   | 0.0374 | 0.00711 | pCi/g | 01/07/16 14:03  | 01/13/16 16:49  | 1              |
| Uranium-235/236 | 0.0457        |                  | 0.0433        | 0.0435  | 0.0465 | 0.00885 | pCi/g | 01/07/16 14:03  | 01/13/16 16:49  | 1              |
| Uranium-238     | 0.363         |                  | 0.106         | 0.110   | 0.0231 | 0.00709 | pCi/g | 01/07/16 14:03  | 01/13/16 16:49  | 1              |
| <b>Tracer</b>   | <b>%Yield</b> | <b>Qualifier</b> | <b>Limits</b> |         |        |         |       | <b>Prepared</b> | <b>Analyzed</b> | <b>Dil Fac</b> |
| Uranium-232     | 93.5          |                  | 30 - 110      |         |        |         |       | 01/07/16 14:03  | 01/13/16 16:49  | 1              |

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

| Analyte                             | Result        | Qualifier        | Count          | Total          | MDC        | DLC        | Unit        | Prepared        | Analyzed        | Dil Fac        |
|-------------------------------------|---------------|------------------|----------------|----------------|------------|------------|-------------|-----------------|-----------------|----------------|
|                                     |               |                  | Uncert.        | Uncert.        |            |            |             |                 |                 |                |
|                                     |               |                  | (2σ+/-)        | (2σ+/-)        |            |            |             |                 |                 |                |
| Actinium-227                        | 0.385         | U                | 0.354          | 0.356          | 1.05       | 0.486      | pCi/g       | 12/23/15 10:44  | 01/13/16 08:16  | 1              |
| Actinium 228                        | 0.366         |                  | 0.212          | 0.215          | 0.315      | 0.136      | pCi/g       | 12/23/15 10:44  | 01/13/16 08:16  | 1              |
| Bismuth-212                         | 0.533         |                  | 0.692          | 0.694          | 1.14       | 0.500      | pCi/g       | 12/23/15 10:44  | 01/13/16 08:16  | 1              |
| Bismuth-214                         | 0.990         |                  | 0.202          | 0.227          | 0.165      | 0.0723     | pCi/g       | 12/23/15 10:44  | 01/13/16 08:16  | 1              |
| Lead-210                            | 2.05          |                  | 1.63           | 1.64           | 2.29       | 1.07       | pCi/g       | 12/23/15 10:44  | 01/13/16 08:16  | 1              |
| Lead-212                            | 0.810         |                  | 0.156          | 0.188          | 0.151      | 0.0698     | pCi/g       | 12/23/15 10:44  | 01/13/16 08:16  | 1              |
| Lead-214                            | 1.10          |                  | 0.179          | 0.212          | 0.201      | 0.0922     | pCi/g       | 12/23/15 10:44  | 01/13/16 08:16  | 1              |
| Potassium-40                        | 12.8          |                  | 1.84           | 2.26           | 1.11       | 0.473      | pCi/g       | 12/23/15 10:44  | 01/13/16 08:16  | 1              |
| Protactinium-231                    | 0.473         | U                | 0.700          | 0.702          | 2.23       | 1.02       | pCi/g       | 12/23/15 10:44  | 01/13/16 08:16  | 1              |
| Radium-226                          | 0.990         |                  | 0.202          | 0.227          | 0.165      | 0.0723     | pCi/g       | 12/23/15 10:44  | 01/13/16 08:16  | 1              |
| Radium-228                          | 0.366         |                  | 0.212          | 0.215          | 0.315      | 0.136      | pCi/g       | 12/23/15 10:44  | 01/13/16 08:16  | 1              |
| Thorium-232                         | 0.366         |                  | 0.212          | 0.215          | 0.315      | 0.136      | pCi/g       | 12/23/15 10:44  | 01/13/16 08:16  | 1              |
| Thorium-234                         | 0.742         | U                | 0.572          | 0.577          | 1.89       | 0.889      | pCi/g       | 12/23/15 10:44  | 01/13/16 08:16  | 1              |
| Thallium-208                        | 0.273         |                  | 0.0762         | 0.0813         | 0.0750     | 0.0322     | pCi/g       | 12/23/15 10:44  | 01/13/16 08:16  | 1              |
| Uranium-235                         | -0.0152       | U                | 0.294          | 0.294          | 0.515      | 0.242      | pCi/g       | 12/23/15 10:44  | 01/13/16 08:16  | 1              |
| Uranium-238                         | 0.742         | U                | 0.572          | 0.577          | 1.89       | 0.889      | pCi/g       | 12/23/15 10:44  | 01/13/16 08:16  | 1              |
| <b>Other Detected Radionuclides</b> |               |                  | <b>Count</b>   | <b>Total</b>   |            |            |             |                 |                 |                |
|                                     |               |                  | <b>Uncert.</b> | <b>Uncert.</b> |            |            |             |                 |                 |                |
|                                     |               |                  | (2σ+/-)        | (2σ+/-)        |            |            |             |                 |                 |                |
| <b>Other Detected Radionuclide</b>  | <b>Result</b> | <b>Qualifier</b> |                |                | <b>MDC</b> | <b>DLC</b> | <b>Unit</b> | <b>Prepared</b> | <b>Analyzed</b> | <b>Dil Fac</b> |
| Other Detected Radionuclide         | None          |                  |                |                |            |            | pCi/g       | 12/23/15 10:44  | 01/13/16 08:16  | 1              |

TestAmerica St. Louis

# Client Sample Results

Client: Tetra Tech EM Inc.  
Project/Site: West Lake Landfill

TestAmerica Job ID: 160-15482-1

**Client Sample ID: SAC-19.005-006.EPADUP**

**Lab Sample ID: 160-15482-6**

Date Collected: 12/21/15 00:00

Matrix: Solid

Date Received: 12/21/15 16:50

**Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)**

| Analyte       | Result        | Qualifier        | Count         | Total   | MDC | DLC  | Unit  | Prepared        | Analyzed        | Dil Fac        |
|---------------|---------------|------------------|---------------|---------|-----|------|-------|-----------------|-----------------|----------------|
|               |               |                  | Uncert.       | Uncert. |     |      |       |                 |                 |                |
|               |               |                  | (2σ+/-)       | (2σ+/-) |     |      |       |                 |                 |                |
| Thorium-228   | 15.9          | U                | 180           | 180     | 395 | 143  | pCi/g | 01/20/16 13:45  | 01/25/16 12:54  | 1              |
| Thorium-230   | 19600         |                  | 1690          | 2360    | 110 | 33.6 | pCi/g | 01/20/16 13:45  | 01/25/16 12:54  | 1              |
| Thorium-232   | 72.7          |                  | 103           | 103     | 109 | 33.4 | pCi/g | 01/20/16 13:45  | 01/25/16 12:54  | 1              |
| <b>Tracer</b> | <b>%Yield</b> | <b>Qualifier</b> | <b>Limits</b> |         |     |      |       | <b>Prepared</b> | <b>Analyzed</b> | <b>Dil Fac</b> |
| Thorium-229   | 103           |                  | 30 - 110      |         |     |      |       | 01/20/16 13:45  | 01/25/16 12:54  | 1              |

**Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)**

| Analyte         | Result        | Qualifier        | Count         | Total   | MDC    | DLC    | Unit  | Prepared        | Analyzed        | Dil Fac        |
|-----------------|---------------|------------------|---------------|---------|--------|--------|-------|-----------------|-----------------|----------------|
|                 |               |                  | Uncert.       | Uncert. |        |        |       |                 |                 |                |
|                 |               |                  | (2σ+/-)       | (2σ+/-) |        |        |       |                 |                 |                |
| Uranium-233/234 | 56.7          |                  | 1.96          | 5.15    | 0.105  | 0.0270 | pCi/g | 01/07/16 14:03  | 01/13/16 16:49  | 1              |
| Uranium-235/236 | 2.68          |                  | 0.475         | 0.525   | 0.0632 | 0.0194 | pCi/g | 01/07/16 14:03  | 01/13/16 16:49  | 1              |
| Uranium-238     | 55.8          |                  | 1.94          | 5.07    | 0.104  | 0.0269 | pCi/g | 01/07/16 14:03  | 01/13/16 16:49  | 1              |
| <b>Tracer</b>   | <b>%Yield</b> | <b>Qualifier</b> | <b>Limits</b> |         |        |        |       | <b>Prepared</b> | <b>Analyzed</b> | <b>Dil Fac</b> |
| Uranium-232     | 45.1          |                  | 30 - 110      |         |        |        |       | 01/07/16 14:03  | 01/13/16 16:49  | 1              |

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

| Analyte                             | Result | Qualifier | Count          | Total          | MDC   | DLC   | Unit  | Prepared       | Analyzed       | Dil Fac |
|-------------------------------------|--------|-----------|----------------|----------------|-------|-------|-------|----------------|----------------|---------|
|                                     |        |           | Uncert.        | Uncert.        |       |       |       |                |                |         |
|                                     |        |           | (2σ+/-)        | (2σ+/-)        |       |       |       |                |                |         |
| Actinium-227                        | 46.3   |           | 8.56           | 9.95           | 10.7  | 5.31  | pCi/g | 12/23/15 10:44 | 01/13/16 08:40 | 1       |
| Actinium 228                        | 6.97   |           | 1.26           | 1.45           | 3.16  | 1.56  | pCi/g | 12/23/15 10:44 | 01/13/16 08:40 | 1       |
| Bismuth-212                         | 3.31   | U         | 5.93           | 5.94           | 9.81  | 4.85  | pCi/g | 12/23/15 10:44 | 01/13/16 08:40 | 1       |
| Bismuth-214                         | 483    |           | 3.71           | 50.3           | 1.54  | 0.763 | pCi/g | 12/23/15 10:44 | 01/13/16 08:40 | 1       |
| Lead-210                            | 335    |           | 21.0           | 44.6           | 23.7  | 11.8  | pCi/g | 12/23/15 10:44 | 01/13/16 08:40 | 1       |
| Lead-212                            | 1.71   |           | 0.896          | 0.923          | 1.46  | 0.728 | pCi/g | 12/23/15 10:44 | 01/13/16 08:40 | 1       |
| Lead-214                            | 558    |           | 4.01           | 58.2           | 2.17  | 1.08  | pCi/g | 12/23/15 10:44 | 01/13/16 08:40 | 1       |
| Potassium-40                        | 9.04   |           | 5.99           | 6.06           | 9.76  | 4.81  | pCi/g | 12/23/15 10:44 | 01/13/16 08:40 | 1       |
| Protactinium-231                    | 85.8   |           | 13.8           | 16.7           | 21.6  | 10.7  | pCi/g | 12/23/15 10:44 | 01/13/16 08:40 | 1       |
| Radium-226                          | 483    |           | 3.71           | 50.3           | 1.54  | 0.763 | pCi/g | 12/23/15 10:44 | 01/13/16 08:40 | 1       |
| Radium-228                          | 6.97   |           | 1.26           | 1.45           | 3.16  | 1.56  | pCi/g | 12/23/15 10:44 | 01/13/16 08:40 | 1       |
| Thorium-232                         | 6.97   |           | 1.26           | 1.45           | 3.16  | 1.56  | pCi/g | 12/23/15 10:44 | 01/13/16 08:40 | 1       |
| Thorium-234                         | 27.4   |           | 7.14           | 7.69           | 26.1  | 13.0  | pCi/g | 12/23/15 10:44 | 01/13/16 08:40 | 1       |
| Thallium-208                        | 0.711  |           | 0.437          | 0.443          | 0.711 | 0.351 | pCi/g | 12/23/15 10:44 | 01/13/16 08:40 | 1       |
| Uranium-235                         | 98.2   |           | 6.04           | 11.7           | 6.43  | 3.20  | pCi/g | 12/23/15 10:44 | 01/13/16 08:40 | 1       |
| Uranium-238                         | 27.4   |           | 7.14           | 7.69           | 26.1  | 13.0  | pCi/g | 12/23/15 10:44 | 01/13/16 08:40 | 1       |
| <b>Other Detected Radionuclides</b> |        |           | <b>Count</b>   | <b>Total</b>   |       |       |       |                |                |         |
|                                     |        |           | <b>Uncert.</b> | <b>Uncert.</b> |       |       |       |                |                |         |
|                                     |        |           | (2σ+/-)        | (2σ+/-)        |       |       |       |                |                |         |
| Th-227                              | 46.3   |           | 8.56           | 9.95           | 10.7  | 5.31  | pCi/g | 12/23/15 10:44 | 01/13/16 08:40 | 1       |

TestAmerica St. Louis

# Client Sample Results

Client: Tetra Tech EM Inc.  
Project/Site: West Lake Landfill

TestAmerica Job ID: 160-15482-1

**Client Sample ID: SAC-24.004-005.EPADUP**

**Lab Sample ID: 160-15482-7**

Date Collected: 12/21/15 00:00

Matrix: Solid

Date Received: 12/21/15 16:50

**Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)**

| Analyte     | Result | Qualifier | Count    | Total   | MDC | DLC  | Unit  | Prepared       | Analyzed       | Dil Fac |
|-------------|--------|-----------|----------|---------|-----|------|-------|----------------|----------------|---------|
|             |        |           | Uncert.  | Uncert. |     |      |       |                |                |         |
|             |        |           | (2σ+/-)  | (2σ+/-) |     |      |       |                |                |         |
| Thorium-228 | 116    | U         | 221      | 221     | 407 | 140  | pCi/g | 01/20/16 13:45 | 01/25/16 12:54 | 1       |
| Thorium-230 | 26700  |           | 2130     | 3100    | 262 | 67.4 | pCi/g | 01/20/16 13:45 | 01/25/16 12:54 | 1       |
| Thorium-232 | 84.2   |           | 119      | 119     | 126 | 38.7 | pCi/g | 01/20/16 13:45 | 01/25/16 12:54 | 1       |
| Tracer      | %Yield | Qualifier | Limits   |         |     |      |       | Prepared       | Analyzed       | Dil Fac |
| Thorium-229 | 102    |           | 30 - 110 |         |     |      |       | 01/20/16 13:45 | 01/25/16 12:54 | 1       |

**Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)**

| Analyte         | Result | Qualifier | Count    | Total   | MDC    | DLC    | Unit  | Prepared       | Analyzed       | Dil Fac |
|-----------------|--------|-----------|----------|---------|--------|--------|-------|----------------|----------------|---------|
|                 |        |           | Uncert.  | Uncert. |        |        |       |                |                |         |
|                 |        |           | (2σ+/-)  | (2σ+/-) |        |        |       |                |                |         |
| Uranium-233/234 | 48.5   |           | 1.77     | 4.44    | 0.0778 | 0.0148 | pCi/g | 01/07/16 14:03 | 01/13/16 16:49 | 1       |
| Uranium-235/236 | 2.25   |           | 0.426    | 0.466   | 0.112  | 0.0260 | pCi/g | 01/07/16 14:03 | 01/13/16 16:49 | 1       |
| Uranium-238     | 49.6   |           | 1.79     | 4.54    | 0.0482 | 0.0148 | pCi/g | 01/07/16 14:03 | 01/13/16 16:49 | 1       |
| Tracer          | %Yield | Qualifier | Limits   |         |        |        |       | Prepared       | Analyzed       | Dil Fac |
| Uranium-232     | 47.7   |           | 30 - 110 |         |        |        |       | 01/07/16 14:03 | 01/13/16 16:49 | 1       |

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

| Analyte                      | Result | Qualifier | Count   | Total   | MDC   | DLC   | Unit  | Prepared       | Analyzed       | Dil Fac |
|------------------------------|--------|-----------|---------|---------|-------|-------|-------|----------------|----------------|---------|
|                              |        |           | Uncert. | Uncert. |       |       |       |                |                |         |
|                              |        |           | (2σ+/-) | (2σ+/-) |       |       |       |                |                |         |
| Actinium-227                 | 53.6   |           | 9.68    | 11.3    | 12.7  | 6.32  | pCi/g | 12/23/15 10:44 | 01/13/16 08:54 | 1       |
| Actinium 228                 | 9.52   |           | 1.54    | 1.82    | 4.45  | 2.20  | pCi/g | 12/23/15 10:44 | 01/13/16 08:54 | 1       |
| Bismuth-212                  | -1.16  | U         | 7.99    | 7.99    | 13.3  | 6.57  | pCi/g | 12/23/15 10:44 | 01/13/16 08:54 | 1       |
| Bismuth-214                  | 618    |           | 4.83    | 64.4    | 1.99  | 0.983 | pCi/g | 12/23/15 10:44 | 01/13/16 08:54 | 1       |
| Lead-210                     | 370    |           | 31.0    | 53.4    | 34.0  | 16.9  | pCi/g | 12/23/15 10:44 | 01/13/16 08:54 | 1       |
| Lead-212                     | 1.91   |           | 1.12    | 1.15    | 1.84  | 0.915 | pCi/g | 12/23/15 10:44 | 01/13/16 08:54 | 1       |
| Lead-214                     | 698    |           | 5.01    | 72.7    | 2.77  | 1.38  | pCi/g | 12/23/15 10:44 | 01/13/16 08:54 | 1       |
| Potassium-40                 | 17.0   |           | 8.28    | 8.46    | 8.82  | 4.31  | pCi/g | 12/23/15 10:44 | 01/13/16 08:54 | 1       |
| Protactinium-231             | 121    |           | 17.1    | 21.7    | 26.7  | 13.2  | pCi/g | 12/23/15 10:44 | 01/13/16 08:54 | 1       |
| Radium-226                   | 618    |           | 4.83    | 64.4    | 1.99  | 0.983 | pCi/g | 12/23/15 10:44 | 01/13/16 08:54 | 1       |
| Radium-228                   | 9.52   |           | 1.54    | 1.82    | 4.45  | 2.20  | pCi/g | 12/23/15 10:44 | 01/13/16 08:54 | 1       |
| Thorium-232                  | 9.52   |           | 1.54    | 1.82    | 4.45  | 2.20  | pCi/g | 12/23/15 10:44 | 01/13/16 08:54 | 1       |
| Thorium-234                  | 21.1   |           | 7.25    | 7.58    | 23.7  | 11.8  | pCi/g | 12/23/15 10:44 | 01/13/16 08:54 | 1       |
| Thallium-208                 | 1.34   |           | 0.559   | 0.576   | 0.900 | 0.444 | pCi/g | 12/23/15 10:44 | 01/13/16 08:54 | 1       |
| Uranium-235                  | 128    |           | 4.64    | 13.8    | 6.61  | 3.29  | pCi/g | 12/23/15 10:44 | 01/13/16 08:54 | 1       |
| Uranium-238                  | 21.1   |           | 7.25    | 7.58    | 23.7  | 11.8  | pCi/g | 12/23/15 10:44 | 01/13/16 08:54 | 1       |
| Other Detected Radionuclides | Result | Qualifier | Count   | Total   | MDC   | DLC   | Unit  | Prepared       | Analyzed       | Dil Fac |
| Th-227                       | 53.6   |           | 9.68    | 11.3    | 12.7  | 6.32  | pCi/g | 12/23/15 10:44 | 01/13/16 08:54 | 1       |

TestAmerica St. Louis

# Client Sample Results

Client: Tetra Tech EM Inc.  
Project/Site: West Lake Landfill

TestAmerica Job ID: 160-15482-1

**Client Sample ID: SAC-18.002-005.EPADUP**

**Lab Sample ID: 160-15482-8**

Date Collected: 12/21/15 00:00

Matrix: Solid

Date Received: 12/21/15 16:50

**Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)**

| Analyte     | Result | Qualifier | Count    | Total   | MDC  | DLC  | Unit  | Prepared       | Analyzed       | Dil Fac |
|-------------|--------|-----------|----------|---------|------|------|-------|----------------|----------------|---------|
|             |        |           | Uncert.  | Uncert. |      |      |       |                |                |         |
|             |        |           | (2σ+/-)  | (2σ+/-) |      |      |       |                |                |         |
| Thorium-228 | 20.9   | U         | 81.3     | 81.4    | 169  | 59.4 | pCi/g | 01/20/16 13:45 | 01/25/16 12:54 | 1       |
| Thorium-230 | 9650   |           | 804      | 1140    | 112  | 30.7 | pCi/g | 01/20/16 13:45 | 01/25/16 12:54 | 1       |
| Thorium-232 | -8.31  | U         | 11.8     | 11.8    | 93.1 | 21.6 | pCi/g | 01/20/16 13:45 | 01/25/16 12:54 | 1       |
| Tracer      | %Yield | Qualifier | Limits   |         |      |      |       | Prepared       | Analyzed       | Dil Fac |
| Thorium-229 | 96.3   |           | 30 - 110 |         |      |      |       | 01/20/16 13:45 | 01/25/16 12:54 | 1       |

**Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)**

| Analyte         | Result | Qualifier | Count    | Total   | MDC   | DLC   | Unit  | Prepared       | Analyzed       | Dil Fac |
|-----------------|--------|-----------|----------|---------|-------|-------|-------|----------------|----------------|---------|
|                 |        |           | Uncert.  | Uncert. |       |       |       |                |                |         |
|                 |        |           | (2σ+/-)  | (2σ+/-) |       |       |       |                |                |         |
| Uranium-233/234 | 173    |           | 11.2     | 18.4    | 1.17  | 0.314 | pCi/g | 01/21/16 14:35 | 01/26/16 13:45 | 1       |
| Uranium-235/236 | 9.40   |           | 2.91     | 3.02    | 1.02  | 0.174 | pCi/g | 01/21/16 14:35 | 01/26/16 13:45 | 1       |
| Uranium-238     | 161    |           | 10.8     | 17.3    | 0.937 | 0.198 | pCi/g | 01/21/16 14:35 | 01/26/16 13:45 | 1       |
| Tracer          | %Yield | Qualifier | Limits   |         |       |       |       | Prepared       | Analyzed       | Dil Fac |
| Uranium-232     | 78.8   |           | 30 - 110 |         |       |       |       | 01/21/16 14:35 | 01/26/16 13:45 | 1       |

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

| Analyte                      | Result | Qualifier | Count   | Total   | MDC   | DLC   | Unit  | Prepared       | Analyzed       | Dil Fac |
|------------------------------|--------|-----------|---------|---------|-------|-------|-------|----------------|----------------|---------|
|                              |        |           | Uncert. | Uncert. |       |       |       |                |                |         |
|                              |        |           | (2σ+/-) | (2σ+/-) |       |       |       |                |                |         |
| Actinium-227                 | 108    |           | 7.04    | 13.7    | 13.2  | 6.54  | pCi/g | 12/23/15 10:44 | 01/13/16 08:57 | 1       |
| Actinium 228                 | 4.61   |           | 2.26    | 2.31    | 2.62  | 1.27  | pCi/g | 12/23/15 10:44 | 01/13/16 08:57 | 1       |
| Bismuth-212                  | 10.8   |           | 6.42    | 6.52    | 7.68  | 3.72  | pCi/g | 12/23/15 10:44 | 01/13/16 08:57 | 1       |
| Bismuth-214                  | 276    |           | 4.13    | 29.0    | 1.75  | 0.858 | pCi/g | 12/23/15 10:44 | 01/13/16 08:57 | 1       |
| Lead-210                     | 243    |           | 22.2    | 36.2    | 26.9  | 13.3  | pCi/g | 12/23/15 10:44 | 01/13/16 08:57 | 1       |
| Lead-212                     | 4.51   |           | 1.11    | 1.26    | 1.45  | 0.715 | pCi/g | 12/23/15 10:44 | 01/13/16 08:57 | 1       |
| Lead-214                     | 329    |           | 4.10    | 34.5    | 2.14  | 1.06  | pCi/g | 12/23/15 10:44 | 01/13/16 08:57 | 1       |
| Potassium-40                 | 20.7   |           | 5.08    | 5.50    | 6.98  | 3.34  | pCi/g | 12/23/15 10:44 | 01/13/16 08:57 | 1       |
| Protactinium-231             | 120    |           | 15.3    | 20.2    | 22.5  | 11.1  | pCi/g | 12/23/15 10:44 | 01/13/16 08:57 | 1       |
| Radium-226                   | 276    |           | 4.13    | 29.0    | 1.75  | 0.858 | pCi/g | 12/23/15 10:44 | 01/13/16 08:57 | 1       |
| Radium-228                   | 4.61   |           | 2.26    | 2.31    | 2.62  | 1.27  | pCi/g | 12/23/15 10:44 | 01/13/16 08:57 | 1       |
| Thorium-232                  | 4.61   |           | 2.26    | 2.31    | 2.62  | 1.27  | pCi/g | 12/23/15 10:44 | 01/13/16 08:57 | 1       |
| Thorium-234                  | 176    |           | 19.9    | 27.1    | 26.3  | 13.0  | pCi/g | 12/23/15 10:44 | 01/13/16 08:57 | 1       |
| Thallium-208                 | 1.70   |           | 0.679   | 0.701   | 0.766 | 0.374 | pCi/g | 12/23/15 10:44 | 01/13/16 08:57 | 1       |
| Uranium-235                  | 91.3   |           | 6.45    | 11.3    | 6.84  | 3.40  | pCi/g | 12/23/15 10:44 | 01/13/16 08:57 | 1       |
| Uranium-238                  | 176    |           | 19.9    | 27.1    | 26.3  | 13.0  | pCi/g | 12/23/15 10:44 | 01/13/16 08:57 | 1       |
| Other Detected Radionuclides | Result | Qualifier | Count   | Total   | MDC   | DLC   | Unit  | Prepared       | Analyzed       | Dil Fac |
| Th-227                       | 108    |           | Uncert. | Uncert. |       |       |       |                |                |         |
|                              |        |           | (2σ+/-) | (2σ+/-) |       |       |       |                |                |         |
|                              |        |           | 7.04    | 13.7    | 13.2  | 6.54  | pCi/g | 12/23/15 10:44 | 01/13/16 08:57 | 1       |

TestAmerica St. Louis

# Client Sample Results

Client: Tetra Tech EM Inc.  
Project/Site: West Lake Landfill

TestAmerica Job ID: 160-15482-1

**Client Sample ID: SAC-25.037-038.EPADUP**

**Lab Sample ID: 160-15482-9**

Date Collected: 12/21/15 00:00

Matrix: Solid

Date Received: 12/21/15 16:50

**Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)**

| Analyte       | Result        | Qualifier        | Count         | Total   | MDC    | DLC     | Unit  | Prepared        | Analyzed        | Dil Fac        |
|---------------|---------------|------------------|---------------|---------|--------|---------|-------|-----------------|-----------------|----------------|
|               |               |                  | Uncert.       | Uncert. |        |         |       |                 |                 |                |
|               |               |                  | (2σ+/-)       | (2σ+/-) |        |         |       |                 |                 |                |
| Thorium-228   | 0.972         |                  | 0.175         | 0.193   | 0.0840 | 0.0308  | pCi/g | 01/20/16 13:45  | 01/25/16 12:54  | 1              |
| Thorium-230   | 1.22          |                  | 0.192         | 0.218   | 0.0463 | 0.0119  | pCi/g | 01/20/16 13:45  | 01/25/16 12:54  | 1              |
| Thorium-232   | 0.864         |                  | 0.160         | 0.176   | 0.0223 | 0.00685 | pCi/g | 01/20/16 13:45  | 01/25/16 12:54  | 1              |
| <b>Tracer</b> | <b>%Yield</b> | <b>Qualifier</b> | <b>Limits</b> |         |        |         |       | <b>Prepared</b> | <b>Analyzed</b> | <b>Dil Fac</b> |
| Thorium-229   | 103           |                  | 30 - 110      |         |        |         |       | 01/20/16 13:45  | 01/25/16 12:54  | 1              |

**Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)**

| Analyte         | Result        | Qualifier        | Count         | Total   | MDC    | DLC     | Unit  | Prepared        | Analyzed        | Dil Fac        |
|-----------------|---------------|------------------|---------------|---------|--------|---------|-------|-----------------|-----------------|----------------|
|                 |               |                  | Uncert.       | Uncert. |        |         |       |                 |                 |                |
|                 |               |                  | (2σ+/-)       | (2σ+/-) |        |         |       |                 |                 |                |
| Uranium-233/234 | 0.690         |                  | 0.147         | 0.158   | 0.0518 | 0.0143  | pCi/g | 01/07/16 14:03  | 01/13/16 16:49  | 1              |
| Uranium-235/236 | 0.0458        |                  | 0.0434        | 0.0436  | 0.0467 | 0.00887 | pCi/g | 01/07/16 14:03  | 01/13/16 16:49  | 1              |
| Uranium-238     | 0.990         |                  | 0.175         | 0.194   | 0.0232 | 0.00711 | pCi/g | 01/07/16 14:03  | 01/13/16 16:49  | 1              |
| <b>Tracer</b>   | <b>%Yield</b> | <b>Qualifier</b> | <b>Limits</b> |         |        |         |       | <b>Prepared</b> | <b>Analyzed</b> | <b>Dil Fac</b> |
| Uranium-232     | 99.5          |                  | 30 - 110      |         |        |         |       | 01/07/16 14:03  | 01/13/16 16:49  | 1              |

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

| Analyte                             | Result        | Qualifier        | Count          | Total          | MDC        | DLC        | Unit        | Prepared        | Analyzed        | Dil Fac        |
|-------------------------------------|---------------|------------------|----------------|----------------|------------|------------|-------------|-----------------|-----------------|----------------|
|                                     |               |                  | Uncert.        | Uncert.        |            |            |             |                 |                 |                |
|                                     |               |                  | (2σ+/-)        | (2σ+/-)        |            |            |             |                 |                 |                |
| Actinium-227                        | 0.256         | U                | 0.601          | 0.602          | 1.41       | 0.664      | pCi/g       | 12/23/15 10:44  | 01/13/16 08:57  | 1              |
| Actinium 228                        | 1.48          |                  | 0.322          | 0.355          | 0.307      | 0.128      | pCi/g       | 12/23/15 10:44  | 01/13/16 08:57  | 1              |
| Bismuth-212                         | 2.61          |                  | 0.951          | 0.989          | 0.717      | 0.276      | pCi/g       | 12/23/15 10:44  | 01/13/16 08:57  | 1              |
| Bismuth-214                         | 1.08          |                  | 0.231          | 0.257          | 0.200      | 0.0883     | pCi/g       | 12/23/15 10:44  | 01/13/16 08:57  | 1              |
| Lead-210                            | 1.31          | U                | 1.93           | 1.93           | 3.36       | 1.59       | pCi/g       | 12/23/15 10:44  | 01/13/16 08:57  | 1              |
| Lead-212                            | 1.14          |                  | 0.196          | 0.245          | 0.188      | 0.0875     | pCi/g       | 12/23/15 10:44  | 01/13/16 08:57  | 1              |
| Lead-214                            | 1.13          |                  | 0.243          | 0.270          | 0.227      | 0.104      | pCi/g       | 12/23/15 10:44  | 01/13/16 08:57  | 1              |
| Potassium-40                        | 16.3          |                  | 2.23           | 2.78           | 1.30       | 0.553      | pCi/g       | 12/23/15 10:44  | 01/13/16 08:57  | 1              |
| Protactinium-231                    | 0.406         | U                | 0.352          | 0.355          | 3.16       | 1.47       | pCi/g       | 12/23/15 10:44  | 01/13/16 08:57  | 1              |
| Radium-226                          | 1.08          |                  | 0.231          | 0.257          | 0.200      | 0.0883     | pCi/g       | 12/23/15 10:44  | 01/13/16 08:57  | 1              |
| Radium-228                          | 1.48          |                  | 0.322          | 0.355          | 0.307      | 0.128      | pCi/g       | 12/23/15 10:44  | 01/13/16 08:57  | 1              |
| Thorium-232                         | 1.48          |                  | 0.322          | 0.355          | 0.307      | 0.128      | pCi/g       | 12/23/15 10:44  | 01/13/16 08:57  | 1              |
| Thorium-234                         | 1.31          |                  | 0.744          | 0.757          | 2.41       | 1.14       | pCi/g       | 12/23/15 10:44  | 01/13/16 08:57  | 1              |
| Thallium-208                        | 0.377         |                  | 0.0984         | 0.106          | 0.0951     | 0.0413     | pCi/g       | 12/23/15 10:44  | 01/13/16 08:57  | 1              |
| Uranium-235                         | 0.254         |                  | 0.294          | 0.296          | 0.482      | 0.222      | pCi/g       | 12/23/15 10:44  | 01/13/16 08:57  | 1              |
| Uranium-238                         | 1.31          |                  | 0.744          | 0.757          | 2.41       | 1.14       | pCi/g       | 12/23/15 10:44  | 01/13/16 08:57  | 1              |
| <b>Other Detected Radionuclides</b> |               |                  | <b>Count</b>   | <b>Total</b>   |            |            |             |                 |                 |                |
|                                     |               |                  | <b>Uncert.</b> | <b>Uncert.</b> |            |            |             |                 |                 |                |
|                                     |               |                  | (2σ+/-)        | (2σ+/-)        |            |            |             |                 |                 |                |
| <b>Other Detected Radionuclide</b>  | <b>Result</b> | <b>Qualifier</b> |                |                | <b>MDC</b> | <b>DLC</b> | <b>Unit</b> | <b>Prepared</b> | <b>Analyzed</b> | <b>Dil Fac</b> |
| Other Detected Radionuclide         | None          |                  |                |                |            |            | pCi/g       | 12/23/15 10:44  | 01/13/16 08:57  | 1              |

TestAmerica St. Louis

# Client Sample Results

Client: Tetra Tech EM Inc.  
Project/Site: West Lake Landfill

TestAmerica Job ID: 160-15482-1

**Client Sample ID: SAC-23.023-024.EPADUP**

**Lab Sample ID: 160-15482-10**

Date Collected: 12/21/15 00:00

Matrix: Solid

Date Received: 12/21/15 16:50

**Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)**

| Analyte     | Result | Qualifier | Count    | Total   | MDC  | DLC  | Unit  | Prepared       | Analyzed       | Dil Fac |
|-------------|--------|-----------|----------|---------|------|------|-------|----------------|----------------|---------|
|             |        |           | Uncert.  | Uncert. |      |      |       |                |                |         |
|             |        |           | (2σ+/-)  | (2σ+/-) |      |      |       |                |                |         |
| Thorium-228 | 66.8   |           | 84.0     | 84.1    | 134  | 42.5 | pCi/g | 01/20/16 13:45 | 01/25/16 12:54 | 1       |
| Thorium-230 | 7970   |           | 722      | 985     | 49.1 | 15.1 | pCi/g | 01/20/16 13:45 | 01/25/16 12:54 | 1       |
| Thorium-232 | 0.000  | U         | 8.14     | 8.14    | 48.9 | 15.0 | pCi/g | 01/20/16 13:45 | 01/25/16 12:54 | 1       |
| Tracer      | %Yield | Qualifier | Limits   |         |      |      |       | Prepared       | Analyzed       | Dil Fac |
| Thorium-229 | 94.9   |           | 30 - 110 |         |      |      |       | 01/20/16 13:45 | 01/25/16 12:54 | 1       |

**Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)**

| Analyte         | Result | Qualifier | Count    | Total   | MDC    | DLC    | Unit  | Prepared       | Analyzed       | Dil Fac |
|-----------------|--------|-----------|----------|---------|--------|--------|-------|----------------|----------------|---------|
|                 |        |           | Uncert.  | Uncert. |        |        |       |                |                |         |
|                 |        |           | (2σ+/-)  | (2σ+/-) |        |        |       |                |                |         |
| Uranium-233/234 | 32.1   |           | 1.26     | 2.98    | 0.0373 | 0.0114 | pCi/g | 01/07/16 14:03 | 01/13/16 16:49 | 1       |
| Uranium-235/236 | 1.95   |           | 0.348    | 0.384   | 0.0749 | 0.0142 | pCi/g | 01/07/16 14:03 | 01/13/16 16:49 | 1       |
| Uranium-238     | 33.0   |           | 1.28     | 3.05    | 0.0696 | 0.0162 | pCi/g | 01/07/16 14:03 | 01/13/16 16:49 | 1       |
| Tracer          | %Yield | Qualifier | Limits   |         |        |        |       | Prepared       | Analyzed       | Dil Fac |
| Uranium-232     | 57.1   |           | 30 - 110 |         |        |        |       | 01/07/16 14:03 | 01/13/16 16:49 | 1       |

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

| Analyte                      | Result | Qualifier | Count   | Total   | MDC   | DLC   | Unit  | Prepared       | Analyzed       | Dil Fac |
|------------------------------|--------|-----------|---------|---------|-------|-------|-------|----------------|----------------|---------|
|                              |        |           | Uncert. | Uncert. |       |       |       |                |                |         |
|                              |        |           | (2σ+/-) | (2σ+/-) |       |       |       |                |                |         |
| Actinium-227                 | 37.0   |           | 6.34    | 7.52    | 7.80  | 3.87  | pCi/g | 12/23/15 10:44 | 01/13/16 09:26 | 1       |
| Actinium 228                 | 2.72   |           | 1.75    | 1.77    | 1.79  | 0.876 | pCi/g | 12/23/15 10:44 | 01/13/16 09:26 | 1       |
| Bismuth-212                  | 1.80   | U         | 4.04    | 4.04    | 6.71  | 3.30  | pCi/g | 12/23/15 10:44 | 01/13/16 09:26 | 1       |
| Bismuth-214                  | 217    |           | 2.51    | 22.7    | 0.998 | 0.491 | pCi/g | 12/23/15 10:44 | 01/13/16 09:26 | 1       |
| Lead-210                     | 221    |           | 14.3    | 29.7    | 16.2  | 8.05  | pCi/g | 12/23/15 10:44 | 01/13/16 09:26 | 1       |
| Lead-212                     | 0.837  |           | 0.595   | 0.605   | 0.974 | 0.483 | pCi/g | 12/23/15 10:44 | 01/13/16 09:26 | 1       |
| Lead-214                     | 250    |           | 2.42    | 26.1    | 1.46  | 0.723 | pCi/g | 12/23/15 10:44 | 01/13/16 09:26 | 1       |
| Potassium-40                 | 10.7   |           | 4.73    | 4.85    | 4.86  | 2.36  | pCi/g | 12/23/15 10:44 | 01/13/16 09:26 | 1       |
| Protactinium-231             | 52.3   |           | 9.60    | 11.2    | 14.9  | 7.35  | pCi/g | 12/23/15 10:44 | 01/13/16 09:26 | 1       |
| Radium-226                   | 217    |           | 2.51    | 22.7    | 0.998 | 0.491 | pCi/g | 12/23/15 10:44 | 01/13/16 09:26 | 1       |
| Radium-228                   | 2.72   |           | 1.75    | 1.77    | 1.79  | 0.876 | pCi/g | 12/23/15 10:44 | 01/13/16 09:26 | 1       |
| Thorium-232                  | 2.72   |           | 1.75    | 1.77    | 1.79  | 0.876 | pCi/g | 12/23/15 10:44 | 01/13/16 09:26 | 1       |
| Thorium-234                  | 22.1   |           | 4.91    | 5.42    | 16.1  | 7.99  | pCi/g | 12/23/15 10:44 | 01/13/16 09:26 | 1       |
| Thallium-208                 | 0.357  |           | 0.538   | 0.539   | 0.618 | 0.305 | pCi/g | 12/23/15 10:44 | 01/13/16 09:26 | 1       |
| Uranium-235                  | 46.1   |           | 2.67    | 5.39    | 3.82  | 1.90  | pCi/g | 12/23/15 10:44 | 01/13/16 09:26 | 1       |
| Uranium-238                  | 22.1   |           | 4.91    | 5.42    | 16.1  | 7.99  | pCi/g | 12/23/15 10:44 | 01/13/16 09:26 | 1       |
| Other Detected Radionuclides | Result | Qualifier | Count   | Total   | MDC   | DLC   | Unit  | Prepared       | Analyzed       | Dil Fac |
| Th-227                       | 37.0   |           | 6.34    | 7.52    | 7.80  | 3.87  | pCi/g | 12/23/15 10:44 | 01/13/16 09:26 | 1       |

TestAmerica St. Louis

# QC Sample Results

Client: Tetra Tech EM Inc.  
Project/Site: West Lake Landfill

TestAmerica Job ID: 160-15482-1

## Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Lab Sample ID: MB 160-233359/1-A  
Matrix: Solid  
Analysis Batch: 234002

Client Sample ID: Method Blank  
Prep Type: Total/NA  
Prep Batch: 233359

| Analyte     | MB MB     |           | Count           | Total           | MDC            | DLC            | Unit    | Prepared       | Analyzed       | Dil Fac |
|-------------|-----------|-----------|-----------------|-----------------|----------------|----------------|---------|----------------|----------------|---------|
|             | Result    | Qualifier | Uncert. (2σ+/-) | Uncert. (2σ+/-) |                |                |         |                |                |         |
| Thorium-228 | -0.008536 | U         | 0.00764         | 0.00767         | 0.0486         | 0.0140         | pCi/g   | 01/20/16 13:45 | 01/25/16 12:54 | 1       |
| Thorium-230 | 0.03950   |           | 0.0337          | 0.0339          | 0.0331         | 0.00628        | pCi/g   | 01/20/16 13:45 | 01/25/16 12:54 | 1       |
| Thorium-232 | 0.0000    | U         | 0.00340         | 0.00340         | 0.0204         | 0.00625        | pCi/g   | 01/20/16 13:45 | 01/25/16 12:54 | 1       |
| Tracer      | MB MB     |           | Limits          |                 | Prepared       | Analyzed       | Dil Fac |                |                |         |
| %Yield      | Qualifier |           |                 |                 |                |                |         |                |                |         |
| Thorium-229 | 105       |           | 30 - 110        |                 | 01/20/16 13:45 | 01/25/16 12:54 | 1       |                |                |         |

Lab Sample ID: LCS 160-233359/2-A  
Matrix: Solid  
Analysis Batch: 234003

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA  
Prep Batch: 233359

| Analyte     | Spike Added | LCS Result | LCS Qual | Total           | MDC      | DLC      | Unit    | %Rec | %Rec.    |
|-------------|-------------|------------|----------|-----------------|----------|----------|---------|------|----------|
|             |             |            |          | Uncert. (2σ+/-) |          |          |         |      | Limits   |
| Thorium-230 | 24.5        | 22.81      |          | 2.23            | 0.101    | 0.0293   | pCi/g   | 93   | 81 - 118 |
| Tracer      | LCS LCS     |            | Limits   |                 | Prepared | Analyzed | Dil Fac |      |          |
| %Yield      | Qualifier   |            |          |                 |          |          |         |      |          |
| Thorium-229 | 101         |            | 30 - 110 |                 |          |          |         |      |          |

## Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Lab Sample ID: MB 160-231168/1-A  
Matrix: Solid  
Analysis Batch: 232139

Client Sample ID: Method Blank  
Prep Type: Total/NA  
Prep Batch: 231168

| Analyte         | MB MB     |           | Count           | Total           | MDC            | DLC            | Unit    | Prepared       | Analyzed       | Dil Fac |
|-----------------|-----------|-----------|-----------------|-----------------|----------------|----------------|---------|----------------|----------------|---------|
|                 | Result    | Qualifier | Uncert. (2σ+/-) | Uncert. (2σ+/-) |                |                |         |                |                |         |
| Uranium-233/234 | 0.1294    |           | 0.0658          | 0.0667          | 0.0397         | 0.00755        | pCi/g   | 01/07/16 14:03 | 01/13/16 16:49 | 1       |
| Uranium-235/236 | 0.01022   |           | 0.0204          | 0.0205          | 0.0307         | 0.00940        | pCi/g   | 01/07/16 14:03 | 01/13/16 16:49 | 1       |
| Uranium-238     | 0.01639   |           | 0.0232          | 0.0232          | 0.0246         | 0.00754        | pCi/g   | 01/07/16 14:03 | 01/13/16 16:49 | 1       |
| Tracer          | MB MB     |           | Limits          |                 | Prepared       | Analyzed       | Dil Fac |                |                |         |
| %Yield          | Qualifier |           |                 |                 |                |                |         |                |                |         |
| Uranium-232     | 87.6      |           | 30 - 110        |                 | 01/07/16 14:03 | 01/13/16 16:49 | 1       |                |                |         |

Lab Sample ID: LCS 160-231168/2-A  
Matrix: Solid  
Analysis Batch: 232140

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA  
Prep Batch: 231168

| Analyte         | Spike Added | LCS Result | LCS Qual | Total           | MDC      | DLC      | Unit    | %Rec | %Rec.    |
|-----------------|-------------|------------|----------|-----------------|----------|----------|---------|------|----------|
|                 |             |            |          | Uncert. (2σ+/-) |          |          |         |      | Limits   |
| Uranium-233/234 | 6.37        | 6.752      |          | 0.746           | 0.0537   | 0.0138   | pCi/g   | 106  | 84 - 120 |
| Uranium-238     | 6.51        | 6.449      |          | 0.719           | 0.0419   | 0.00796  | pCi/g   | 99   | 82 - 122 |
| Tracer          | LCS LCS     |            | Limits   |                 | Prepared | Analyzed | Dil Fac |      |          |
| %Yield          | Qualifier   |            |          |                 |          |          |         |      |          |
| Uranium-232     | 82.2        |            | 30 - 110 |                 |          |          |         |      |          |

TestAmerica St. Louis

# QC Sample Results

Client: Tetra Tech EM Inc.  
Project/Site: West Lake Landfill

TestAmerica Job ID: 160-15482-1

## Method: A-01-R - Isotopic Uranium (Alpha Spectrometry) (Continued)

Lab Sample ID: MB 160-233547/1-A

Matrix: Solid

Analysis Batch: 234185

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 233547

| Analyte         | MB MB     |           | Count              | Total              | MDC            | DLC            | Unit    | Prepared       | Analyzed       | Dil Fac |
|-----------------|-----------|-----------|--------------------|--------------------|----------------|----------------|---------|----------------|----------------|---------|
|                 | Result    | Qualifier | Uncert.<br>(2σ+/-) | Uncert.<br>(2σ+/-) |                |                |         |                |                |         |
| Uranium-233/234 | 0.002673  | U         | 0.0228             | 0.0228             | 0.0653         | 0.0166         | pCi/g   | 01/21/16 14:35 | 01/26/16 13:45 | 1       |
| Uranium-235/236 | -0.007485 | U         | 0.00864            | 0.00867            | 0.0757         | 0.0179         | pCi/g   | 01/21/16 14:35 | 01/26/16 13:45 | 1       |
| Uranium-238     | 0.05136   |           | 0.0479             | 0.0481             | 0.0486         | 0.00828        | pCi/g   | 01/21/16 14:35 | 01/26/16 13:45 | 1       |
| Tracer          | MB MB     |           | Limits             |                    | Prepared       | Analyzed       | Dil Fac |                |                |         |
| %Yield          | Qualifier |           |                    |                    |                |                |         |                |                |         |
| Uranium-232     | 88.4      |           | 30 - 110           |                    | 01/21/16 14:35 | 01/26/16 13:45 | 1       |                |                |         |

Lab Sample ID: LCS 160-233547/2-A

Matrix: Solid

Analysis Batch: 234188

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 233547

| Analyte         | Spike Added | LCS Result | LCS Qual | Total              | MDC      | DLC      | Unit    | %Rec | %Rec.    |
|-----------------|-------------|------------|----------|--------------------|----------|----------|---------|------|----------|
|                 |             |            |          | Uncert.<br>(2σ+/-) |          |          |         |      | Limits   |
| Uranium-233/234 | 6.37        | 6.680      |          | 0.776              | 0.0323   | 0.00835  | pCi/g   | 105  | 84 - 120 |
| Uranium-238     | 6.51        | 5.909      |          | 0.707              | 0.0611   | 0.0144   | pCi/g   | 91   | 82 - 122 |
| Tracer          | LCS LCS     |            | Limits   |                    | Prepared | Analyzed | Dil Fac |      |          |
| %Yield          | Qualifier   |            |          |                    |          |          |         |      |          |
| Uranium-232     | 89.7        |            | 30 - 110 |                    |          |          |         |      |          |

Lab Sample ID: LCSD 160-233547/3-A

Matrix: Solid

Analysis Batch: 234189

Client Sample ID: Lab Control Sample Dup

Prep Type: Total/NA

Prep Batch: 233547

| Analyte         | Spike Added | LCSD Result | LCSD Qual | Total              | MDC      | DLC      | Unit    | %Rec | %Rec.    | RER  | RER Limit |
|-----------------|-------------|-------------|-----------|--------------------|----------|----------|---------|------|----------|------|-----------|
|                 |             |             |           | Uncert.<br>(2σ+/-) |          |          |         |      | Limits   |      |           |
| Uranium-233/234 | 6.37        | 5.902       |           | 0.704              | 0.0317   | 0.00820  | pCi/g   | 93   | 84 - 120 | 0.53 | 1         |
| Uranium-238     | 6.51        | 6.765       |           | 0.780              | 0.0316   | 0.00818  | pCi/g   | 104  | 82 - 122 | 0.58 | 1         |
| Tracer          | LCSD LCSD   |             | Limits    |                    | Prepared | Analyzed | Dil Fac |      |          |      |           |
| %Yield          | Qualifier   |             |           |                    |          |          |         |      |          |      |           |
| Uranium-232     | 88.9        |             | 30 - 110  |                    |          |          |         |      |          |      |           |

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-229177/1-A

Matrix: Solid

Analysis Batch: 232243

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 229177

| Analyte      | MB MB     |           | Count              | Total              | MDC    | DLC    | Unit  | Prepared       | Analyzed       | Dil Fac |
|--------------|-----------|-----------|--------------------|--------------------|--------|--------|-------|----------------|----------------|---------|
|              | Result    | Qualifier | Uncert.<br>(2σ+/-) | Uncert.<br>(2σ+/-) |        |        |       |                |                |         |
| Actinium-227 | 0.06975   | U         | 0.249              | 0.249              | 0.449  | 0.194  | pCi/g | 12/23/15 10:44 | 01/13/16 07:22 | 1       |
| Actinium 228 | 0.01929   | U         | 0.0519             | 0.0520             | 0.0924 | 0.0292 | pCi/g | 12/23/15 10:44 | 01/13/16 07:22 | 1       |
| Bismuth-212  | 0.06234   | U         | 0.328              | 0.328              | 0.624  | 0.257  | pCi/g | 12/23/15 10:44 | 01/13/16 07:22 | 1       |
| Bismuth-214  | -0.007616 | U         | 0.101              | 0.101              | 0.152  | 0.0683 | pCi/g | 12/23/15 10:44 | 01/13/16 07:22 | 1       |
| Lead-210     | -0.03061  | U         | 0.582              | 0.582              | 1.08   | 0.475  | pCi/g | 12/23/15 10:44 | 01/13/16 07:22 | 1       |

TestAmerica St. Louis

# QC Sample Results

Client: Tetra Tech EM Inc.  
Project/Site: West Lake Landfill

TestAmerica Job ID: 160-15482-1

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: MB 160-229177/1-A  
Matrix: Solid  
Analysis Batch: 232243

Client Sample ID: Method Blank  
Prep Type: Total/NA  
Prep Batch: 229177

| Analyte                      | MB MB     |              | Count                    | Total                    | MDC    | DLC    | Unit  | Prepared       | Analyzed       | Dil Fac |
|------------------------------|-----------|--------------|--------------------------|--------------------------|--------|--------|-------|----------------|----------------|---------|
|                              | Result    | Qualifier    | Uncert.<br>(2σ+/-)       | Uncert.<br>(2σ+/-)       |        |        |       |                |                |         |
| Lead-212                     | 0.006398  | U            | 0.0436                   | 0.0436                   | 0.0789 | 0.0351 | pCi/g | 12/23/15 10:44 | 01/13/16 07:22 | 1       |
| Lead-214                     | -0.02629  | U            | 0.306                    | 0.306                    | 0.112  | 0.0497 | pCi/g | 12/23/15 10:44 | 01/13/16 07:22 | 1       |
| Potassium-40                 | -0.2230   | U            | 1.09                     | 1.09                     | 0.924  | 0.395  | pCi/g | 12/23/15 10:44 | 01/13/16 07:22 | 1       |
| Protactinium-231             | -0.2133   | U            | 0.725                    | 0.726                    | 1.29   | 0.570  | pCi/g | 12/23/15 10:44 | 01/13/16 07:22 | 1       |
| Radium-226                   | -0.007616 | U            | 0.101                    | 0.101                    | 0.152  | 0.0683 | pCi/g | 12/23/15 10:44 | 01/13/16 07:22 | 1       |
| Radium-228                   | 0.01929   | U            | 0.0519                   | 0.0520                   | 0.0924 | 0.0292 | pCi/g | 12/23/15 10:44 | 01/13/16 07:22 | 1       |
| Thorium-232                  | 0.01929   | U            | 0.0519                   | 0.0520                   | 0.0924 | 0.0292 | pCi/g | 12/23/15 10:44 | 01/13/16 07:22 | 1       |
| Thorium-234                  | -0.02056  | U            | 0.519                    | 0.519                    | 0.944  | 0.425  | pCi/g | 12/23/15 10:44 | 01/13/16 07:22 | 1       |
| Thallium-208                 | 0.0000    | U            | 0.00614                  | 0.00614                  | 0.0805 | 0.0361 | pCi/g | 12/23/15 10:44 | 01/13/16 07:22 | 1       |
| Uranium-235                  | 0.03895   | U            | 0.0610                   | 0.0612                   | 0.214  | 0.0942 | pCi/g | 12/23/15 10:44 | 01/13/16 07:22 | 1       |
| Uranium-238                  | -0.02056  | U            | 0.519                    | 0.519                    | 0.944  | 0.425  | pCi/g | 12/23/15 10:44 | 01/13/16 07:22 | 1       |
| Other Detected Radionuclides | MB Result | MB Qualifier | Count Uncert.<br>(2σ+/-) | Total Uncert.<br>(2σ+/-) | MDC    | DLC    | Unit  | Prepared       | Analyzed       | Dil Fac |
| Other Detected Radionuclide  | None      |              |                          |                          |        |        | pCi/g | 12/23/15 10:44 | 01/13/16 07:22 | 1       |

Lab Sample ID: LCS 160-229177/2-A  
Matrix: Solid  
Analysis Batch: 232250

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA  
Prep Batch: 229177

| Analyte       | Spike Added | LCS Result | LCS Qual | Total              | MDC   | DLC    | Unit  | %Rec | %Rec Limits |
|---------------|-------------|------------|----------|--------------------|-------|--------|-------|------|-------------|
|               |             |            |          | Uncert.<br>(2σ+/-) |       |        |       |      |             |
| Americium-241 | 97.2        | 104.5      |          | 11.0               | 1.23  | 0.608  | pCi/g | 108  | 87 - 116    |
| Cesium-137    | 29.9        | 29.80      |          | 3.19               | 0.267 | 0.128  | pCi/g | 100  | 87 - 120    |
| Cobalt-60     | 18.1        | 17.60      |          | 1.83               | 0.120 | 0.0509 | pCi/g | 97   | 87 - 115    |

Lab Sample ID: 160-15482-1 DU  
Matrix: Solid  
Analysis Batch: 232243

Client Sample ID: SAC-05.011-012.EPADUP  
Prep Type: Total/NA  
Prep Batch: 229177

| Analyte          | Sample Result | Sample Qual | DU DU   |      | Total              | MDC    | DLC    | Unit  | RER  | RER Limit |
|------------------|---------------|-------------|---------|------|--------------------|--------|--------|-------|------|-----------|
|                  |               |             | Result  | Qual | Uncert.<br>(2σ+/-) |        |        |       |      |           |
| Actinium-227     | 0.590         |             | 0.03841 | U    | 0.0508             | 1.22   | 0.581  | pCi/g | 0.72 | 1         |
| Actinium 228     | 1.31          |             | 1.155   |      | 0.269              | 0.218  | 0.0922 | pCi/g | 0.26 | 1         |
| Bismuth-212      | 2.45          |             | 1.637   |      | 0.743              | 0.690  | 0.290  | pCi/g | 0.50 | 1         |
| Bismuth-214      | 1.32          |             | 1.201   |      | 0.225              | 0.116  | 0.0501 | pCi/g | 0.23 | 1         |
| Lead-210         | 4.02          |             | 1.234   |      | 1.37               | 2.22   | 1.05   | pCi/g | 0.76 | 1         |
| Lead-212         | 0.933         |             | 1.130   |      | 0.229              | 0.156  | 0.0735 | pCi/g | 0.44 | 1         |
| Lead-214         | 1.33          |             | 1.246   |      | 0.236              | 0.158  | 0.0727 | pCi/g | 0.17 | 1         |
| Potassium-40     | 15.3          |             | 16.95   |      | 2.54               | 0.797  | 0.332  | pCi/g | 0.31 | 1         |
| Protactinium-231 | 0.454         | U           | 0.2764  | U    | 0.646              | 1.83   | 0.837  | pCi/g | 0.1  | 1         |
| Radium-226       | 1.32          |             | 1.201   |      | 0.225              | 0.116  | 0.0501 | pCi/g | 0.23 | 1         |
| Radium-228       | 1.31          |             | 1.155   |      | 0.269              | 0.218  | 0.0922 | pCi/g | 0.26 | 1         |
| Thorium-232      | 1.31          |             | 1.155   |      | 0.269              | 0.218  | 0.0922 | pCi/g | 0.26 | 1         |
| Thorium-234      | 0.822         | U           | 1.236   |      | 0.557              | 2.30   | 1.10   | pCi/g | 0.30 | 1         |
| Thallium-208     | 0.426         |             | 0.3598  |      | 0.0892             | 0.0620 | 0.0268 | pCi/g | 0.32 | 1         |
| Uranium-235      | 0.269         | U           | 0.3514  |      | 0.182              | 0.542  | 0.258  | pCi/g | 0.15 | 1         |

TestAmerica St. Louis

# QC Sample Results

Client: Tetra Tech EM Inc.  
 Project/Site: West Lake Landfill

TestAmerica Job ID: 160-15482-1

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: 160-15482-1 DU  
 Matrix: Solid  
 Analysis Batch: 232243

Client Sample ID: SAC-05.011-012.EPADUP  
 Prep Type: Total/NA  
 Prep Batch: 229177

| Analyte                             | Sample Result        | Sample Qual        | DU Result        | DU Qual        | Total                        | MDC        | DLC        | Unit         | RER        | RER              |
|-------------------------------------|----------------------|--------------------|------------------|----------------|------------------------------|------------|------------|--------------|------------|------------------|
|                                     |                      |                    |                  |                | Uncert. (2σ+/-)              |            |            |              |            | Limit            |
| Uranium-238                         | 0.822                | U                  | 1.236            |                | 0.557                        | 2.30       | 1.10       | pCi/g        | 0.30       | 1                |
| <i>Other Detected Radionuclides</i> | <i>Sample Result</i> | <i>Sample Qual</i> | <i>DU Result</i> | <i>DU Qual</i> | <i>Total Uncert. (2σ+/-)</i> | <i>MDC</i> | <i>DLC</i> | <i>Unit</i>  | <i>RER</i> | <i>RER Limit</i> |
| <i>Other Detected Radionuclide</i>  | <i>None</i>          |                    | <i>None</i>      |                |                              |            |            | <i>pCi/g</i> |            |                  |

# QC Association Summary

Client: Tetra Tech EM Inc.  
Project/Site: West Lake Landfill

TestAmerica Job ID: 160-15482-1

## Rad

### Leach Batch: 228939

| Lab Sample ID  | Client Sample ID      | Prep Type | Matrix | Method        | Prep Batch |
|----------------|-----------------------|-----------|--------|---------------|------------|
| 160-15482-1    | SAC-05.011-012.EPADUP | Total/NA  | Solid  | Dry and Grind |            |
| 160-15482-1 DU | SAC-05.011-012.EPADUP | Total/NA  | Solid  | Dry and Grind |            |
| 160-15482-2    | SAC-05.025-026.EPADUP | Total/NA  | Solid  | Dry and Grind |            |
| 160-15482-3    | SAC-14.025-026.EPADUP | Total/NA  | Solid  | Dry and Grind |            |
| 160-15482-4    | SAC-13.020-022.EPADUP | Total/NA  | Solid  | Dry and Grind |            |
| 160-15482-5    | SAC-10.026-028.EPADUP | Total/NA  | Solid  | Dry and Grind |            |
| 160-15482-6    | SAC-19.005-006.EPADUP | Total/NA  | Solid  | Dry and Grind |            |
| 160-15482-7    | SAC-24.004-005.EPADUP | Total/NA  | Solid  | Dry and Grind |            |
| 160-15482-8    | SAC-18.002-005.EPADUP | Total/NA  | Solid  | Dry and Grind |            |
| 160-15482-9    | SAC-25.037-038.EPADUP | Total/NA  | Solid  | Dry and Grind |            |
| 160-15482-10   | SAC-23.023-024.EPADUP | Total/NA  | Solid  | Dry and Grind |            |

### Prep Batch: 229177

| Lab Sample ID      | Client Sample ID      | Prep Type | Matrix | Method      | Prep Batch |
|--------------------|-----------------------|-----------|--------|-------------|------------|
| 160-15482-1        | SAC-05.011-012.EPADUP | Total/NA  | Solid  | Fill_Geo-21 | 228939     |
| 160-15482-1 DU     | SAC-05.011-012.EPADUP | Total/NA  | Solid  | Fill_Geo-21 | 228939     |
| 160-15482-2        | SAC-05.025-026.EPADUP | Total/NA  | Solid  | Fill_Geo-21 | 228939     |
| 160-15482-3        | SAC-14.025-026.EPADUP | Total/NA  | Solid  | Fill_Geo-21 | 228939     |
| 160-15482-4        | SAC-13.020-022.EPADUP | Total/NA  | Solid  | Fill_Geo-21 | 228939     |
| 160-15482-5        | SAC-10.026-028.EPADUP | Total/NA  | Solid  | Fill_Geo-21 | 228939     |
| 160-15482-6        | SAC-19.005-006.EPADUP | Total/NA  | Solid  | Fill_Geo-21 | 228939     |
| 160-15482-7        | SAC-24.004-005.EPADUP | Total/NA  | Solid  | Fill_Geo-21 | 228939     |
| 160-15482-8        | SAC-18.002-005.EPADUP | Total/NA  | Solid  | Fill_Geo-21 | 228939     |
| 160-15482-9        | SAC-25.037-038.EPADUP | Total/NA  | Solid  | Fill_Geo-21 | 228939     |
| 160-15482-10       | SAC-23.023-024.EPADUP | Total/NA  | Solid  | Fill_Geo-21 | 228939     |
| LCS 160-229177/2-A | Lab Control Sample    | Total/NA  | Solid  | Fill_Geo-21 |            |
| MB 160-229177/1-A  | Method Blank          | Total/NA  | Solid  | Fill_Geo-21 |            |

### Prep Batch: 231168

| Lab Sample ID      | Client Sample ID      | Prep Type | Matrix | Method   | Prep Batch |
|--------------------|-----------------------|-----------|--------|----------|------------|
| 160-15482-1        | SAC-05.011-012.EPADUP | Total/NA  | Solid  | ExtChrom | 228939     |
| 160-15482-2        | SAC-05.025-026.EPADUP | Total/NA  | Solid  | ExtChrom | 228939     |
| 160-15482-3        | SAC-14.025-026.EPADUP | Total/NA  | Solid  | ExtChrom | 228939     |
| 160-15482-4        | SAC-13.020-022.EPADUP | Total/NA  | Solid  | ExtChrom | 228939     |
| 160-15482-5        | SAC-10.026-028.EPADUP | Total/NA  | Solid  | ExtChrom | 228939     |
| 160-15482-6        | SAC-19.005-006.EPADUP | Total/NA  | Solid  | ExtChrom | 228939     |
| 160-15482-7        | SAC-24.004-005.EPADUP | Total/NA  | Solid  | ExtChrom | 228939     |
| 160-15482-9        | SAC-25.037-038.EPADUP | Total/NA  | Solid  | ExtChrom | 228939     |
| 160-15482-10       | SAC-23.023-024.EPADUP | Total/NA  | Solid  | ExtChrom | 228939     |
| LCS 160-231168/2-A | Lab Control Sample    | Total/NA  | Solid  | ExtChrom |            |
| MB 160-231168/1-A  | Method Blank          | Total/NA  | Solid  | ExtChrom |            |

### Prep Batch: 233359

| Lab Sample ID | Client Sample ID      | Prep Type | Matrix | Method   | Prep Batch |
|---------------|-----------------------|-----------|--------|----------|------------|
| 160-15482-1   | SAC-05.011-012.EPADUP | Total/NA  | Solid  | ExtChrom | 228939     |
| 160-15482-2   | SAC-05.025-026.EPADUP | Total/NA  | Solid  | ExtChrom | 228939     |
| 160-15482-3   | SAC-14.025-026.EPADUP | Total/NA  | Solid  | ExtChrom | 228939     |
| 160-15482-4   | SAC-13.020-022.EPADUP | Total/NA  | Solid  | ExtChrom | 228939     |
| 160-15482-5   | SAC-10.026-028.EPADUP | Total/NA  | Solid  | ExtChrom | 228939     |
| 160-15482-6   | SAC-19.005-006.EPADUP | Total/NA  | Solid  | ExtChrom | 228939     |
| 160-15482-7   | SAC-24.004-005.EPADUP | Total/NA  | Solid  | ExtChrom | 228939     |

TestAmerica St. Louis

# QC Association Summary

Client: Tetra Tech EM Inc.  
Project/Site: West Lake Landfill

TestAmerica Job ID: 160-15482-1

## Rad (Continued)

### Prep Batch: 233359 (Continued)

| Lab Sample ID      | Client Sample ID      | Prep Type | Matrix | Method   | Prep Batch |
|--------------------|-----------------------|-----------|--------|----------|------------|
| 160-15482-8        | SAC-18.002-005.EPADUP | Total/NA  | Solid  | ExtChrom | 228939     |
| 160-15482-9        | SAC-25.037-038.EPADUP | Total/NA  | Solid  | ExtChrom | 228939     |
| 160-15482-10       | SAC-23.023-024.EPADUP | Total/NA  | Solid  | ExtChrom | 228939     |
| LCS 160-233359/2-A | Lab Control Sample    | Total/NA  | Solid  | ExtChrom |            |
| MB 160-233359/1-A  | Method Blank          | Total/NA  | Solid  | ExtChrom |            |

### Prep Batch: 233547

| Lab Sample ID       | Client Sample ID       | Prep Type | Matrix | Method   | Prep Batch |
|---------------------|------------------------|-----------|--------|----------|------------|
| 160-15482-8         | SAC-18.002-005.EPADUP  | Total/NA  | Solid  | ExtChrom | 228939     |
| LCS 160-233547/2-A  | Lab Control Sample     | Total/NA  | Solid  | ExtChrom |            |
| LCSD 160-233547/3-A | Lab Control Sample Dup | Total/NA  | Solid  | ExtChrom |            |
| MB 160-233547/1-A   | Method Blank           | Total/NA  | Solid  | ExtChrom |            |

TestAmerica St. Louis

# Tracer/Carrier Summary

Client: Tetra Tech EM Inc.  
Project/Site: West Lake Landfill

TestAmerica Job ID: 160-15482-1

## Method: A-01-R - Isotopic Thorium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

|                    |                       | Percent Yield (Acceptance Limits) |  |
|--------------------|-----------------------|-----------------------------------|--|
| Lab Sample ID      | Client Sample ID      | Th-229<br>(30-110)                |  |
| 160-15482-1        | SAC-05.011-012.EPADUP | 95.8                              |  |
| 160-15482-2        | SAC-05.025-026.EPADUP | 92.9                              |  |
| 160-15482-3        | SAC-14.025-026.EPADUP | 92.7                              |  |
| 160-15482-4        | SAC-13.020-022.EPADUP | 107                               |  |
| 160-15482-5        | SAC-10.026-028.EPADUP | 98.6                              |  |
| 160-15482-6        | SAC-19.005-006.EPADUP | 103                               |  |
| 160-15482-7        | SAC-24.004-005.EPADUP | 102                               |  |
| 160-15482-8        | SAC-18.002-005.EPADUP | 96.3                              |  |
| 160-15482-9        | SAC-25.037-038.EPADUP | 103                               |  |
| 160-15482-10       | SAC-23.023-024.EPADUP | 94.9                              |  |
| LCS 160-233359/2-A | Lab Control Sample    | 101                               |  |
| MB 160-233359/1-A  | Method Blank          | 105                               |  |

### Tracer/Carrier Legend

Th-229 = Thorium-229

## Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

|                     |                        | Percent Yield (Acceptance Limits) |  |
|---------------------|------------------------|-----------------------------------|--|
| Lab Sample ID       | Client Sample ID       | U-232<br>(30-110)                 |  |
| 160-15482-1         | SAC-05.011-012.EPADUP  | 85.1                              |  |
| 160-15482-2         | SAC-05.025-026.EPADUP  | 88.5                              |  |
| 160-15482-3         | SAC-14.025-026.EPADUP  | 88.3                              |  |
| 160-15482-4         | SAC-13.020-022.EPADUP  | 96.9                              |  |
| 160-15482-5         | SAC-10.026-028.EPADUP  | 93.5                              |  |
| 160-15482-6         | SAC-19.005-006.EPADUP  | 45.1                              |  |
| 160-15482-7         | SAC-24.004-005.EPADUP  | 47.7                              |  |
| 160-15482-8         | SAC-18.002-005.EPADUP  | 78.8                              |  |
| 160-15482-9         | SAC-25.037-038.EPADUP  | 99.5                              |  |
| 160-15482-10        | SAC-23.023-024.EPADUP  | 57.1                              |  |
| LCS 160-231168/2-A  | Lab Control Sample     | 82.2                              |  |
| LCS 160-233547/2-A  | Lab Control Sample     | 89.7                              |  |
| LCSD 160-233547/3-A | Lab Control Sample Dup | 88.9                              |  |
| MB 160-231168/1-A   | Method Blank           | 87.6                              |  |
| MB 160-233547/1-A   | Method Blank           | 88.4                              |  |

### Tracer/Carrier Legend

U-232 = Uranium-232

TestAmerica St. Louis